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MOORE'S ARTIZAN'S GUIDE.

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FROM

JOHN HARVEY TREAT,

OF LAWRENCE, MASS.

(Class of 1862).

Received ~~April 25~~ Nov. 23, 1888.

THE

ARTIZANS' GUIDE

AND

EVERYBODY'S ASSISTANT:

CONTAINING OVER

TWO THOUSAND NEW AND VALUABLE

RECEIPTS AND TABLES

IN ALMOST EVERY BRANCH OF BUSINESS CONNECTED WITH CIVILIZED LIFE, FROM THE HOUSEHOLD TO THE MANUFACTORY.

BY R. MOORE.

[With an appendix "On [illegible]."]

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PREFACE

THE following work will be found to embrace an immense amount of the most valuable information regarding almost every branch of useful industry. The information has been collected from many sources with much care and expense, many of the items being valuable trade secrets, consequently obtainable only at a heavy cost. On the whole, "THE ARTIZAN'S GUIDE" will be found to embrace a vast amount of most useful knowledge in connection with business and manufacturing requirements, as well as the no less indispensable department of domestic uses, much of this information being very difficult to obtain in books. The Appendix, embracing the subject of correspondences, &c., is now inserted for the first time, and if favourably received will be inserted in future editions. Many persons who are in proper states for receiving these truths remain in total ignorance of their existence, and have no means of knowing them except through some such effort as this. These explanations are now appended for the benefit of all such, certainly not for my own personal emolument, except so far as happiness may be derived from the consciousness of having tried to benefit others, and this, beyond all doubt, is an exceeding great reward.

March 1873.

[**Entered according to Act of Parliament, in the year One Thousand *Eight Hundred* and Seventy-two, by R. MOORE, in the office of the *Minister of Agriculture* and Statistics of the Dominion of Canada.**]

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VALUABLE RECEIPTS.

BAKING AND COOKING DEPARTMENT.

BAKING BREAD.—The quantities and best manner of mixing the different ingredients necessary to make good bread, viz., to make the fermentation, say, for 10 buckets of flour; take 5 gals. of potatoes well boiled and mashed in a tub, with 1 bucket of water (in summer this water should be about milk-warm, in winter much warmer; in all cases this must be governed by the weather), six pounds of flour and five quarts of yeast; stir the whole up well, and cover till it rises. It is better to work the same as soon as it does rise and commences falling again; otherwise the bread will not be so good. The time of rising, however, varies much; sometimes it will rise in eight hours, at other times it will take much longer. Again, to make the sponge; take 2½ buckets of the above ferment, and 2½ buckets of water, milk-warm, run the whole through a sieve into a trough, and make it into light dough, with flour for sponge. When this sponge has risen and commenced falling, add 5 lbs. salt and 5 buckets of water; break the sponge well in the water, and stir up sufficient flour to make a stiff dough, cover it up until it rises sufficiently; it is then fit for being weighed off and put into the tins for baking Let it stand in the tins until it rises, when it should be placed in the oven.

N.B.—A ¼ oz. carbonate of magnesia added to the flour, for a 4 lb. loaf, materially improves the quality of the bread even when made from the very worst new seconds flour. It is usual with baker's to add alum to the flour, in order to make a white, light, and porous bread. Two ounces of alum per 100 lbs. flour is generally sufficient.

HOP YEAST.—Boil 5 gals. water and 10 ozs. hops together from 10 to 15 minutes; put 6 lbs. flour in a tub, to which add as much of the boiling liquor as will be necessary to make a thick paste. When the remainder of the liquor is perfectly cool, add it, together with 1 gal. of stock yeast, to the paste, when the whole will be ready for use.

MALT YEAST.—Boil 10 ozs. hops in 5 gals. of water from 10 to 15 minutes, pour the same into a tub. When cooled to 70° Fahr. add ½ peck of malt; stir the whole up well, and cover it till nearly cool · then add 3 qts. of old yeast to make it ferment.

ANOTHER EXCELLENT BREAD.—Knead 21 lbs. flour with 9 lbs. of pared and mashed potatoes, from which the water has been well steamed off previous to mashing; mix together while the potatoes are warm, adding about 3 or 4 spoonfuls of salt. Then add about 3 qts. milk-*warm water,* with 9 large spoonfuls of yeast, *gradually to the potatoes and flour*; knead and work it well into a smooth dough, and let it stand 4 hours before putting into the oven.

Healthy Mixed Bread.—Boil 3 lbs. of rice to a soft pulp in water; pare and cook by steam 6 lbs. of your best potatoes, mash your potatoes, and rub them up with rice pulp; add to the whole 6 lbs. flour; make all into a dough with water, ferment with yeast, let it stand a proper length of time, and then place it in the oven to bake.

Ærated Bread, without Yeast.—1. Dissolve 1 oz. of sesquicarbonate of ammonia in water, sufficient to make 7 lbs. of flour into a dough, which must be formed into loaves, and baked immediately. 2. Divide 3 lbs. flour into two portions: mix up the first with water, holding in solution 2 oz. bicarbonate of soda; then mix the second portion of flour with water, to which 1 oz. of muriatic acid has been added; knead each mass of the dough thoroughly. When this is done, mix both portions together as rapidly and perfectly as possible, form the mass into loaves, and bake immediately. This bread contains no yeast, and is very wholesome.

Note.—Bicarbonate of soda and muriatic acid, when chemically combined, form common salt.

Superior Bread from Buckwheat Meal.—To 2 qts. of sifted buckwheat meal, add hot water enough to wet the same; when sufficiently cooled, add 1 teaspoonful or more of salt, half a pint of yeast, and half a teaspoonful of molasses; then add wheat flour enough to make it into loaves (it should be kneaded well); and when risen light, bake or steam it three or more hours. If this should get sour while rising, add a teaspoonful of sugar and a little saleratus, dissolved in water. For bread from Indian meal proceed in the same way, using it instead of the buckwheat meal.

Corn-Meal Bread No. 1.—Take 2 qts. of corn meal, with about a pint of (thin) bread sponge, and water enough to wet it; mix in about half a pint of wheat flour, and a tablespoonful of salt; let it rise, and then knead well the second time; bake 1½ hours.

Corn-Meal Bread No. 2.—Mix 2 qts. of new corn meal with three pints of warm water; add 1 tablespoonful of salt, 2 tablespoonfuls of sugar, and 1 large tablespoonful of hop yeast; let it stand in a warm place five hours to rise; then add 1½ teacupfuls of wheat flour, and half a pint of warm water. Let it rise again 1½ hours, then pour it into a pan well greased with sweet lard, and let it rise a few minutes. Then bake, in a moderately hot oven, 1 hour and 30 minutes.

Corn-Meal Bread No. 3.—Take 2 qts. of white corn-meal, 1 tablespoonful of lard, 1 pint of hot water; mix the lard in water; stir it well that it may get heated thoroughly, and add one-half pint of cold water. When the mixture is cool enough, add two well-beaten eggs, and two tablespoonfuls of home-made yeast. Bake 1 hour in a moderately heated oven. If for breakfast, make over night.

London Bakers' Bread.—To make a half-peck loaf, take ¾ lbs. of well-boiled, mealy potatoes; mash them through a fine colander *or coarse sieve; add* ⅛ pt. of yeast, or ¾ oz. German dried yeast, and ¾ pt. lukewarm water (88° Fahr.), together with ¾ lb. of flour, to render the mixture the consistence of thin batter; this mixture is to be set aside to ferment; if set in a warm place, it will rise in less than two hours, when it resembles yeast except in color. The sponge so made is then to be mixed with 1 pt. of water nearly blood warm, viz., 92° Fahr., and poured into a half peck of flour, which has previously had 1¼ oz. salt mixed into it; the whole should then be kneaded into dough, and allowed to rise in a warm place for 2 hours, when it should be kneaded into loaves, and baked.

French Bread.—Take nice rice, ¾ lb.; tie it up in a thick linen bag, giving enough room for it to swell; boil from three to four hours till it becomes a perfect paste; mix while warm with 7 lbs. flour; adding the usual quantities of yeast, salt, and water. Allow the dough to work a proper time near the fire, then divide into loaves, dust them in, and knead vigorously. This quantity will make 13 lbs. 7 oz. of very nutritious bread.

Paris Baker's White Bread.—On 80 lbs. of the dough left from the previous day's baking, as much luke-warm water is poured as will make 320 lbs. flour into a rather thin dough. As soon as this has risen, 80 lbs. are taken out, and reserved in a warm place for next day's baking. One pound of *dry yeast* dissolved in *warm water* is then added to the remaining portion, and the whole lightly kneaded. As soon as it is sufficiently "risen," it is then made into loaves, and shortly afterwards baked, the loaves being placed in the oven without touching each other, so that they may be "crusted" all round.

Brown Bread.—Take equal quantities of Indian meal and rye flour, scald the meal, and when lukewarm add the flour, adding one-half pint of good yeast to four quarts of the mixture, a table-spoon, even full, of salt, and half a cup of molasses, kneading the mixture well. This kind of bread should be softer than wheat flour bread. All the water added after scalding the meal should be lukewarm. When it has risen well, put it to bake in a brick oven or stove, the former should be hotter than for flour bread; if a stove oven, it should be steamed two hours then baked one hour or more; when done it is a dark brown. The best article for baking this kind of bread is brown earthenware—say pans eight or ten inches in height, and diameter about the same; grease or butter the pans; put in the mixture; then dip your hand in cold water and smooth the loaf; after this slash the loaf both ways with a knife, quite deep. Some let it rise a little before they put it to bake. Many people prefer this bread made of one-third rye flour instead of one half. When it is difficult to get rye, wheat flour will answer as a substitute. It adds very much to the richness and flavor of this kind of bread to let it remain in the oven over night.

Gingerbread.—Mix together 3½ lbs. of flour; ¾ lb. butter; 1 lb. sugar; 1 pint molasses; ¼ lb. ginger, and some ground orange-peel.

Dyspepsia Bread.—The following receipt for making bread has proved highly salutary to persons afflicted with dyspepsia, viz.:—3 quarts unbolted *wheat meal;* 1 quart soft water, warm but not hot; 1 gill of fresh yeast; 1 gill molasses, or not, as may suit the taste; 1 teaspoonful of saleratus.

RULES TO BE OBSERVED IN CAKE-MAKING.—1. In making cakes, use refined white sugar, although clean brown sugar does as well. 2. Use good sweet butter in every case. 3. Cake mixture cannot be beaten too much. 4. An earthen basin is the best for beating cake mixture, or eggs in. 5. A good regular heat must be kept up in the oven. 6. Use a broom splint to run through the thickest part of the cake; if done, it will come out clean, if not done, there will be some of the dough sticking to it. This rule applies to bread also. The following cakes will be found to come out all right with a fair trial.

SUPERIOR INDIAN CAKE.—Take 2 cups of Indian meal, 1 tablespoonful of molasses, 2 cups milk, a little salt, a handful of flour, and a little saleratus; mix thin, and pour it into a buttered bakepan, and bake half an hour.

NUT CAKES.—Take 1 lb. flour, ¼ lb. butter, same of sugar, five eggs, and spice to your taste.

SEED CAKE.—1 tea-cup butter, 2 cups sugar, rubbed into 4 cups flour; mix with milk hard enough to roll: ½ teaspoonful saleratus; seeds to your taste.

BUCKWHEAT CAKE.—Make a batter of buckwheat flour as you would for pan-cakes; let it rise light. Then to each quart of the batter add 1 cup of molasses, 2 eggs, 1 teaspoonful of saleratus, a few caraway seeds, and 1 teacupful wheat flour; stir well together, pour into a greased breadpan, and bake in a moderate hot oven ¾ of an hour.

ALMOND CAKE.—Take one pound of almonds, blanched and beaten; ten eggs, well beaten; three-quarters of a pound of sugar, and three-quarters of a pound of flour, well mixed and baked.

WEDDING CAKE.—Take three lbs. flour, three lbs. butter, three lbs. sugar, two dozen eggs, four lbs, raisins, six lbs. of currants, two lbs. citron, one ounce mace, one ounce cinnamon, one ounce nutmeg, half-ounce cloves, half-pint brandy. Beat the batter with your hand to cream; then beat the sugar into the butter; add the froth of the yolks of the eggs, after being well beaten, then the froth of the whites, mix fruit, spice and flour together, then add them in, baking five or six hours for a large loaf.

POUND CAKE.—One pound of flour, one pound of sugar, one pound of butter, eight eggs, three spoonfuls rose-water, mace, or other spice.

BUCKWHEAT SHORT CAKE.—Take 3 or 4 cups nice sour milk, 1 teaspoonful of soda saleratus dissolved in the milk; if the milk is very sour, you must use saleratus in proportion with a littl salt; mix up a dough with buckwheat flour thicker than you would mix the same for griddle cakes, say quite stiff; put into a buttered tin, and put directly into the stove oven, and bake about 30 minutes, or as you would a short-cake from common flour.

SHORT CAKE.—5 lbs. flour, 8 oz. butter, ¾ lbs. sugar, 8 eggs, rose-water and nutmeg.

SUGAR CAKE.—Take 7 eggs, and beat the whites and yolks separately: then beat well together; now put into them sifted white *sugar, 1 lb.; with* melted butter, ½ lb.; add a small teaspoonful of pulverized carbonate of ammonia. Stir in just sufficient sifted flour to allow of its being rolled out, and cut into cakes.

Ginger Cake.—Flour 3 lbs., sugar and butter, each 1 lb., ginger 2 oz., molasses 1 pint, cream ¼ pt. and a little nutmeg; mix warm and bake in slack oven.

Plum Cake.—Flour 1 lb., butter ¼ lb., sugar ¼ lb., currants ¼ lb., 3 eggs, ½ pint milk, carbonate of soda, a small teaspoonful.

Rich Soda Cake.—1 pound of pulverized loaf-sugar mixed with ¾ lb. of sweet butter, the beaten whites of 14 eggs, and two teaspoonfuls of cream of tartar, sifted with a pound of flour, and lastly, a teaspoonful of soda dissolved in half a teacupful of sweet milk, and strained. Bake immediately.

Delicate Tea Cake.—The whites of 3 eggs beaten to a froth, 1 cup of pulverized white sugar, ½ cup of sweet milk, one teaspoonful of cream of tartar, ½ teaspoonful of soda, 2½ cups of flour, a teaspoonful of almonds, ½ cup of melted butter.

Strawberry Short Cake.—One teacupful of sour milk (not buttermilk), a piece of butter the size of a walnut, ⅓ teaspoonful of soda, ¼ teaspoonful of salt. Mix very lightly, and bake in a quick oven. While baking, take 1½ pts. of strawberries, mashed fine with the hand; when the cake is cooked enough, cut in two, taking off about ⅓, leaving ⅔ at the bottom; spread each part thickly with batter, then put on the large portion a layer of sugar, then the berries, then sugar, and lastly, turn the other part over. Serve immediately.

Sponge Cake.—Sift 1 lb. of flour and 1 lb. of loaf sugar; take the juice of 1 lemon, beat 10 eggs very light, mix them well with the sugar, then add the lemon and flour; if baked in a pan, two hours is necessary.

Loaf Cake.—Take 2 lbs. of flour, ½ lb. of sugar, ¼ lb. of butter, 3 eggs, 1 gill of milk, ½ teacupful of sweet yeast, cloves and nutmeg for spice.

Cream Cake.—1 teacup cream, 2 teacups sugar, three well beaten eggs, teaspoonful saleratus dissolved in a wine glass of milk, piece of butter half the size of an egg, flour to make as thick as pound cake, add raisins and spice to taste; wine and brandy if you like.

Corn Starch Cake.—½ lb. of sugar, 4 oz. of butter, 5 eggs, 1 teaspoonful cream of tartar, ½ teaspoonful soda, ½ pound of corn starch, ½ a gill of sweet milk.

Railroad Cake.—A pint of flour 1 teaspoonful of cream of tartar, ½ a teaspoonful of soda, a tablespoonful of butter, a teaspoonful of sugar; bake the batter in a square pan twenty minutes.

Mountain Cake.—1 cup of sugar, 2 eggs, half cup butter, half cup of milk or water, 2 cups of flour, teaspoonful of cream of tartar, half a teaspoonful of soda, nutmeg.

Poor Man's Cake.—1 cup of sugar, ½ cup of butter, 1 cup sour cream, 1 egg, flour enough to make a good batter, ½ a teaspoonful of saleratus.

Fruit Cake.—1½ lbs. sugar, 1¼ lbs. flour, ¾ lb. butter, 6 eggs, a pint of sweet milk, 2 teaspoonfuls saleratus, 1 glass of wine, 1 of brandy, and as *much fruit and* spice as you can afford and no *more.*

Scotch Short Bread.—Flour 2 pounds, butter 1 pound, brown sugar ½ pound, blanched almonds, cut small, ¼ pound, candied lemon peel, ¼ pound ; beat the butter to a cream, and add it to the flour and sugar with the other ingredients. When well kneaded and incorporated roll it out into cakes about one inch thick. Bake in a moderate oven.

Gold Cake.—Yolks of 1 doz. eggs ; flour, 5 cups ; white sugar, and butter, of each, one cup ; cream or sweet milk, 1 cup ; cream of tartar, 1 teaspoon ; soda, ½ teaspoon. Beat the eggs with the sugar ; have the butter softened by the fire, then stir it in ; put the soda and cream of tartar into the cream or milk, stirring up and mixing all together ; then sift and stir in the flour.

Wonders.—2 pounds flour, ½ pound butter, ½ ounce sugar, 10 eggs, cinnamon.

Cookies.—3 pounds flour, ¾ pound butter, ¾ pound sugar, 3 eggs ; or, without eggs, wet up, raise with saleratus and sour milk.

Common.—12 pounds flour, 3 pounds butter, 3 pounds sugar, 2 quarts milk, yeast, spice to taste.

Loaf.—9 quarts flour, 3 pounds butter, 4 pounds sugar, 1 gallon milk, wine 1 pint, yeast 1 pint.

Cider Cake.—Flour, 6 cups ; sugar, 3 cups ; butter, 1 cup ; cider, 1 cup ; saleratus, 1 teaspoon ; 4 eggs ; 1 grated nutmeg. Beat the eggs, sugar, and butter together, and stir in the flour and nutmeg ; dissolve the saleratus in the cider, and stir into the mass, and bake immediately in a quick oven.

Molasses Cake.—Molasses, 1½ cups ; saleratus, 1 teaspoon ; sour milk, 2 cups ; 2 eggs ; butter, lard, or pork gravy, what you would take upon a spoon ; if you use lard, add a little salt. Mix all by beating a minute or two with a spoon ; dissolving the saleratus in the milk ; then stir in flour to give it the consistency of soft cake and put directly into a hot oven, being careful not to dry by over baking.

Rock Cakes.—Mix together 1 lb. of flour ; ½ lb. of sugar ; ½ lb of butter ; ½ lb. of currants or cherries, and 4 eggs, leaving out the whites of 2 ; a little wine and candied lemon-peel are a great improvement.

Jumbles.—Take 1 lb. of loaf-sugar, pounded fine ; 1¼ lb. of flour ; ¾ lb. of butter ; 4 eggs, beaten light, and a little rose-water and spice ; mix them well, and roll them in sugar.

Cup Cakes.—Mix together 5 cups of flour ; 3 cups of sugar ; 1 cup of butter ; 1 cup of milk ; 3 eggs well beaten ; 1 wine-glass of wine ; 1 of brandy, and a little cinnamon.

Cymbals.—2 lbs. flour, 8 oz. butter, ½ lb. sugar, 6 eggs, rose-water and a little spice.

Frosting, or Icing, for Cakes.—The whites of 8 eggs, beat to a perfect froth and stiff ; pulverized white sugar, 2 lbs. ; starch, 1 tablespoon ; pulverized gum arabic, ½ oz. ; juice of 1 lemon ; sift the starch, sugar and gum arabic into the beaten egg, and stir all thoroughly, when the cake is cold lay on the frosting to suit.

Jumbles.—Butter 1 lb., sugar 1 lb., flour 2 lbs., 3 eggs, ½ cup of sour milk ; 1 teaspoonful of soda, roll in white coffee sugar. *This will make a large* batch.

Doughnuts.—Sugar and milk, 2 cups of each ; saleratus, 1 teaspoonful; 3 eggs, and a piece of butter half as large as a small hen's egg, and flour sufficient.

Crullers.—Sugar and melted butter, 6 tablespoonfuls of each; 6 eggs, and flour to roll.

Buns.—1 cup butter, 1 cup sugar, ½ cup of yeast, ½ pint of milk; make it stiff with flour; add, if you like, nutmeg.

Cocoanut Drops.—1 lb. grated cocoanut, ½ lb. white sugar, the white of 6 eggs, cut to a stiff froth. You must have enough whites of egg to wet the whole mixture. Drop on buttered plates, in pieces the size of an egg.

French Rolls.—1 ounce of butter, 1 lb. of flour, 1 gill of home-made yeast, 1 egg, milk enough to make a dough. Rub the butter through the flour, beat the egg and stir in, then add the yeast, milk, and a little salt. Knead the dough; when it is light, mould it out into large biscuits, and bake them on tins.

Muffins.—A quart of milk, 2 eggs, 2 spoonfuls of yeast, 2 lbs. of flour, a lump of butter size of an egg—which is to be melted in the milk—and a little salt; the milk is to be warmed, and the ingredients added. Let it rise, and then turn the mixture into buttered pans, and bake to a light brown.

Bath Cakes.—Mix well together, 1 lb. flour, ½ lb. butter, 5 eggs, and a cupful of yeast, set the whole before the fire to rise; after it rises, add ¼ lb. white sugar, and 1 ounce carraway seeds well mixed in, and roll the paste into little cakes, bake them on tins.

No. 1 Crackers.—Butter, 1 cup; salt, 1 teaspoon; flour, 2 qts. Rub thoroughly together with the hand, and wet up with water; beat well, and beat in flour to make quite brittle and hard; then pinch off pieces, and roll out each cracker by itself.

Sugar Crackers.—Flour, 4 lbs.; loaf sugar and butter, of each ½ lb.; water, 1½ pts.; make as above.

Naples Biscuit.—White sugar, eggs, and flour, of each 4 lbs.

Lemon Biscuit.—Take 3½ lbs. white sugar, 4 lbs. flour, ½ ounce saleratus, ½ lb. suet, a little milk to wet the dough, cut them out about the size of marbles, put them on pans a little greased, and bake them in a hot oven and flavor them with essence of lemon.

Abernethy Biscuit.—Take 8 lbs. of flour, 1¼ lb. of butter, 1 quart of sweet milk, 12 ounces of sugar, 1 ounce of carraway seed, 6 eggs; mix dough of the above, break them in pieces of about two ounces, mould them off, roll them out, prick them and bake them in a moderate oven.

Savoy Biscuit.—Take of sugar the weight of 14 eggs, of flour the weight of 6 eggs, beat the yellows and whites of 12 eggs, separate, grate in the rind of a lemon; after being in the oven a few minutes grate on some sugar. You may add peach-water, or lemon-juice, or any flavoring extract.

Ginger Snaps.—Take 7 lbs. of flour, 1 quart of molasses, 1 lb. of brown sugar, 1 lb. butter, 2 ounces of ground ginger, and then take 1 gill of water, ¾ of an ounce of saleratus; mix them all into dough, and cut them out something larger than marbles, and bake them in a moderate oven.

York *Biscuit.—3 lbs. flour, ½ lb.* butter, ¾ lbs. sugar; wet up, and *raise with sour milk and saleratus.*

Traveller's Biscuit.—2 lbs. of flour, ¾ of a pound of sugar, ¼ lb. butter, 1 teaspoonful of *dissolved* saleratus, milk sufficient to form a dough. Cut up the butter in the flour, add the sugar, and put in the saleratus and milk together, so as to form dough. Knead it till it becomes perfectly smooth and light. Roll it in sheets about ⅛ of an inch thick, cut the cakes with a cutter or the top of a tumbler. Bake in a moderate oven.

Baking Powder for Biscuit.—Bicarbonate of soda 4 lbs., cream of tartar 8 lbs. These ingredients should be thoroughly dried and well mixed, and put up proof against dampness. Use about 3 teaspoonfuls to each quart of flour, mix up with cold water or milk, and put it into the oven at once.

Brown Bread for Biscuits.—Corn meal 4 qts., rye flour 3 qts., wheat flour 1 qt., molasses 2 tablespoonfuls, yeast 6 tablespoonfuls, soda 2 teaspoonfuls. Mix during the evening for breakfast.

Mince Pies—Meat 1 lb., suet 3¼ lbs., currants, raisins and plums, 2 lbs., one glass brandy or wine; allspice, cinnamon and cloves to your taste, sugar sufficient to sweeten. Baked in a short crust.

Fruit Pies.—For all kinds of fruit pies have your fruit sweetened to your taste, and then put in a short crust. Bake in a hot oven.

Pumpkin Pie.—Stew the pumpkin dry, and make it like squash pie, only season rather higher. In the country, where this *real Yankee pie* is prepared in perfection, ginger is almost always used, with other spices. There, too, part cream, instead of milk, is mixed with the pumpkin, which gives a richer flavor.

Lemon Pie.—1 lemon grated, 2 eggs, ½ cup of sugar, 1 cup of molasses, 1 of water, and 3 tablespoonfuls of flour. This makes 3 pies.

Lemon Pie with three crusts.—A layer of crust, a layer of lemon, sliced fine, a little sugar, layer of crust again, and sugar and lemon again, then the upper crust.

Another Way.—1 cup of sugar, 1 cup of sweet milk, 1 egg, 1½ lemon the grated peel and juice, 1 tablespoonful of flour; then after baking, the white of an egg beaten, sweetened, and put on the top; then set in the oven and browned.

Crumb Pie.—Mince any cold meat very finely, season it to taste, and put it into a pie-dish; have some finely-grated bread crumbs, with a little salt, pepper, and nutmeg, and pour into the dish any nice gravy that may be at hand; then cover it over with a thick layer of the bread crumbs, and put small pieces of butter over the top. Place it in the oven till quite hot.

Washington Pie.—1 cup of sugar, third of a cup of butter, half a cup of sweet milk, 1 and a third cup of flour, 1 egg, half a teaspoonful of soda, 1 of cream of tartar, lemon flavor. Grease 2 round tins, and put in the above. Bake until done. Then put it on a dinner plate, spread with nice apple-sauce, or sauce of any kind; then another layer of cake on top. It is nice without sauce, but sauce improves it.

Fruit Pie.—1 cup of sugar, 1 of water, tablespoonful of flour, teaspoonful of lemon essence (or lemon grated), 1 teaspoonful of cream of tartar, half a teaspoonful of soda, half a cup of dried currants: *mix and boil, stirring to* prevent the flour from settling.

Chicken Pie—*Take* one pair of good young chickens, cut in small pieces, season with pepper and salt and small strips of salt pork, put in saucepan with water to cover it, boil for half an hour, add flour and butter to thicken the gravy, have ready a large dish, served with paste, put all in the dish covered with a good rich paste. Bake for half an hour.

Veal Pot Pie.—Take 2 pounds of best veal, cut in small pieces, half pound of salt pork, sliced thin, four quarts of cold water; pepper and salt all, put on the fire; after boiling for 1 hour have 3 pounds of light bread dough, pick small pieces, say one ounce pieces, put in saucepan, with the veal and pork and let it boil for twenty minutes. Serve as soon as taken from the fire

Plum Pudding.—Pound 6 crackers, and soak them over night in milk enough to cover them, then add 3 pints of milk, 4 or 5 eggs, raisins ½ lb., spice with nutmeg and sweeten with sugar and molasses. Bake about 2 hours.

Tapioca Pudding.— Pick and mash a coffee cup full of tapioca, and pour upon it 1 pint boiling milk; after standing ½ an hour, add another pint of cold milk, with sugar and raisins if you desire.

Baked Pudding.— 5 tablespoonfuls of corn starch to 1 quart of milk, dissolve the starch in a part of the milk, heat the remainder of the milk to nearly boiling, having salted it a little, then add the dissolved starch to the milk, boil 3 minutes, stirring it briskly; allow it to cool, and then thoroughly mix with it 3 eggs, well beaten, with 3 tablespoonsfuls of sugar; flavor to your taste and bake it ½ an hour. This pudding ranks second to none.

Orange Pudding.—Take 1 lb. of butter, 1 lb. of sugar, 10 eggs, the juice of 2 oranges, boil the peel, then pound it fine and mix it with the juice Add the juice of 1 lemon, a wineglassful of brandy, wine and rose-water. If you do not have the fruit add the extracts.

Cocoanut Pudding.—To a large grated cocoanut add the whites of 6 eggs, ¼ lb of sugar, 6 ounces of butter, ½ a wineglassful of rose-water, and baked in or out of paste.

Rice Pudding.—Take 1 lb. of rice, boiled well with rich milk, stirring well until it is soft, and then add ¼ lb. butter, 12 eggs, well beaten, and spice to your taste, and bake it.

Hard Times Pudding.—½ pint of molasses or syrup, ½ pint water, 2 teaspoonfuls of soda, 1 teaspoonful of salt, flour enough to make a batter; boil in a bag for 3 hours. Eat it with sauce.

Baked Apple Pudding.—Pare and quarter four large apples, boil them tender with the rind of a lemon in so little water that when done no water may remain, beat them quite fine in a mortar, add the crumb of a small roll, ¼ lb. of butter melted, the yolks of 5 and whites of 3 eggs, juice of ½ lemon, sugar to your taste, beat all well together, all in paste.

Ground Rice, or Sago Pudding.—Boil a large spoonful of it, heaped, in 1 pint milk with lemon peel and cinnamon; when cold add sugar, and nutmegs, and 4 eggs, well beaten.

Custard Pudding.—Take 1 pint milk, 4 spoonfuls flour, 6 eggs spice to your taste and bake.

Winter Pudding.—*Take* the crust of baker's loaf of bread, and *fill it with plums, boil it in milk* and water.

Baked Potatoe Pudding.—Baked potatoes skimmed and mashed 12 oz., suet 1 oz , cheese, grated fine, 1 oz , milk 1 gill. Mix the potatoes, suet, milk, cheese and all together, if not of a proper consistence, add a little water. Bake in an earthen pot.

College Puddings.—¾ lb of stale bread, grated; the same quantity of beef suet, chopped very fine; 1 lb. of currants, ½ nutmeg, a few cloves, a glass of brandy, 2 or 3 eggs, 2 spoonfuls of cream or milk; mix these well together, and make into a paste in the shape of eggs. Fry them gently over a clear fire, in ½ lb of butter; let them be of a nice brown color all over You may add blanched almonds and sweetmeats Serve them up with wine.

Family Pudding.—1 quart of sweet milk, 1 pint of bread crumbs soaked in the milk, 3 eggs well beaten, 1 teacupful of sugar, little mace, 6 good tart apples, pared, cores *dug* out, and stand them in the pudding, and steam until the apples are well done. An hour will suffice.

Cottage Pudding.—1 egg, 1 cup of sugar, 1 of sweet milk, 1 teaspoonful of soda, 2 of cream of tartar, 1 pint of flour, and a little salt. To be eaten with milk and sugar

Green Gooseberries make a nice pudding by stirring a pint of them into a pint of batter, and either baking or boiling.

Lemon Pudding.—Melt 6 oz. of butter, pour it over the same quantity of powdered loaf sugar, stirring it well till cold, then grate the rind of a large lemon, and add it with 8 eggs well beaten and the juice of 2 lemons: stir the whole till it is completely mixed together, and bake the pudding with a paste round the dish.

Sauces and Creams for Puddings.—1. Take equal quantities of sugar and molasses, boil them together, and stir in a little flour · 2 Take the juice of an orange, a cup of sugar and the same of good cream ; 3 Good sour cream made very sweet with sugar; with or without seasoning, makes a good sauce : 4. Beat 2 eggs well, then add a cup of stewed apples and a cup of sugar.

Beef Steak with Onions—Prepare a rump steak by pounding it till quite tender, season with salt, pepper and fresh butter, put in the steak and fry it, when brown on one side turn over, do not let it scorch, when nicely done, take it up, put a little flour over the steak, then add gradually a cup of hot water, seasoned with more salt and pepper, if necessary; then put the water over the fire and boil again, and pour over the steak.

Peel 2 dozen onions, put them on to boil with about 2 quarts of water an hour before the steak is put on to fry. When the steak is done, cut them up, put them in the frying pan, season well with salt, pepper, and butter, sprinkle with flour, stir all well together, place over the fire, stir often to prevent scorching; when they are a little brown and soft, turn them over the steak

Seasoning for Stuffing.—1 lb. of salt, dried and sifted; half an ounce of ground white pepper; two ounces of dried thyme; 1 oz. of dried marjoram; and one oz of nutmeg. When this seasoning is used, parsley only is required to be chopped in sufficient quantity to make the stuffing green. The proportions are—½ pound of bread crumbs; 3 eggs; ¼ lb. of suet; ½ oz. of seasoning; and the peel of half a lemon, grated.

Economical Soup.—Put into a saucepan one-pound pieces of stale bread, three large onions sliced, a small cabbage cut fine, a carrot and turnip, and a small head of celery (or the remains of any cold vegetables), a tablespoonful of salt, a tablespoonful of pepper, a bunch of parsley, a sprig of marjoram and thyme Put these into two quarts of any weak stock, (the liquor in which mutton has been boiled will do,) and let them boil for two hours; rub through a fine hair-sieve, add a pint of new milk, boil up, and serve at once.

Vegetable Soup.—Take a shin of beef, 3 large carrots, 3 large yellow onions, 6 turnips, ½ pound of rice or barley; parsley, leeks, summer savory; put all into a soup-kettle, and let it boil four hours; add pepper and salt to taste; serve altogether. It makes a good family soup.

Pea Soup.—Beet 5 lbs., water 5 qts., 6 large carrots, 6 good turnips, 3 large onions, salt sufficient, put it on a good slow fire, let it boil 3 hours, then strain all the broth from meat and vegetables, and then add 3 lbs. of split peas to the broth; set it on a slow fire for 2 hours, stirring often, so that all the peas will dissolve.; take 1 lb. fresh sausage meat, fried to a crisp and fried bread crumbs ; put all together, add a few fine herbs, and serve hot.

Fricassee Chickens.—Take 2 large young chickens, cut in small pieces, put in cold water for 1 hour to take all the blood out, then put in saucepan to parboil for half an hour, then take from saucepan drained well, have ready 1 qt. good fresh cream, 2 oz. good butter, 1 oz. of flour, all well mixed together; put in saucepan with the chickens; put on the fire to boil tender; season with pepper and salt; served with toast bread in the bottom of the dish.

Baked Tomatoes.—Wash the tomatoes, take out the seed, make a dressing of crumbs of bread and onions chopped fine ; add salt, butter and pepper. Bake and serve hot.

Stewed Tomatoes.—Scald the tomatoes with hot water, take off the skins, put them in an earthen vessel, strain off the water and add butter, salt and pepper to taste.

Mashed Turnips.—Wash turnips, boil well, take them up in the colander, press out all the water, mash very fine; season with salt, butter and sugar. Serve hot with trimmings.

Hashed Meat.—Take 2 lbs of fat corned beef, well boiled and cold; 1 lb. of well boiled potatoes, cold; 1 large white onion; put in chopping tray, mince it fine, put all in saucepan together, add 2 ozs. butter; pepper and salt to taste; add boiling water to make it soft; set it on a slow fire, stirring it often. When well stewed serve hot It makes a fine relish for breakfast.

Lobster Salad.—Take inside of large lobster, mince fine, take yolk of 2 eggs boiled hard and mashed fine, with four tablespoonfuls of sweet oil; pepper, salt, vinegar, and mustard to taste; mix well; add celery or lettuce to taste; then when serving, garnish with hard-boiled eggs.

Succotash.—Take 1 doz. ears of corn, cut the grains from the cob, add 1 qt. of Lima beans, and mix with the corn; put it on to boil in 3 qt. of water with 1 lb. of pork cut; add black pepper and salt to taste. When the water has boiled away to ½ the original quantity, serve in a tureen as soup.

Maccaroni Soup.—4 lbs. of lean beef, 4 qts. of water, carrot, turnip, onions; set it for 4 hours till all mix together; strain it all through a sieve; have 2 lbs. of maccaroni broken into pieces of one inch long; put all into a saucepan together, and let it boil for 10 minutes, and serve it hot.

Boiled Custard, or Mock Cream.—Take 2 tablespoonfuls of corn starch, 1 qt. of milk, 2 or 3 eggs, ½ a teaspoonful of salt and a small piece of butter; heat the milk to nearly boiling and add the starch, previously dissolved in 1 qt. of milk, then add the eggs, well beaten, with 4 tablespoonfuls of powdered sugar; let it boil up once or twice, stirring it briskly, and it is done. Flavor with lemon or vanilla, or raspberry, or to suit your taste.

Lemon Cream.—Take a pint of thick cream and put to it the yolks of two eggs, well beaten, 4 oz. of fine sugar and the thin rind of a lemon; boil it up, then stir till almost cold; put the juice of a lemon in a dish or bowl and pour the cream upon it, stirring till quite cold.

Fruit Creams.—Take ½ oz. of isinglass dissolved in a little water, then put 1 pt. of good cream, sweetened to the taste; boil it When nearly cold lay some apricot or raspberry jam on the bottom of a glass dish and pour it over This is most excellent.

Raspberry Cream.—Put 6 ozs. of raspberry jam to 1 qt. of cream, pulp it through a lawn sieve, add to it the juice of a lemon and a little sugar, and whisk it till thick. Serve it in a dish or glasses.

To roast fowls the fire must be quick and clear. If smoky, it will spoil both their taste and looks Baste frequently, and keep a white paper pinned on the breast till it is near done

Turkey.—A good sized turkey should be roasted 2½ hours or 3 hours—very slowly at first. If you wish to make plain stuffing, pound a cracker or crumble some bread very fine, chop some raw salt pork very fine, sift some sage, (and summer-savory, or sweet-marjoram, if you have them in the house, and fancy them,) and mould them all together, seasoned with a little pepper. An egg worked in makes the stuffing cut better

Boiled Turkey.—Clean the turkey, fill the crop with stuffing, and sew it up. Put it over the fire in water enough to cover it, let it boil slowly—take off all the scum When this is done, it should only simmer till it is done. Put a little salt into the water, and dredge the turkey with flour before boiling.

Roast Ducks and Geese.—Take sage, wash and pick it, and an onion; chop them fine, with pepper and salt, and put them in the belly, let the goose be clean picked, and wiped dry with a cloth, inside and out; put it down to the fire, and roast it brown. Ducks are dressed in the same way. For wild ducks, teal, pigeons, and other wild fowl, use only pepper and salt, with gravy in the dish.

Roast Chicken.—Chickens should be managed in roasting the same as turkeys, only that they require less time. From an hour to an hour and a half is long enough.

Boiled Chicken.—*A* chicken should be boiled the same as a *turkey, only it will* take less time—about 35 minutes is sufficient. Use the same stuffing, if any, and serve it up with parsley, or egg-sauce.

Broiled Chicken.—Slit them down the back and season with pepper and salt; lay them on a clear fire of coals, the inside next the fire till half done, then turn, and broil to a fine brown color. Broil about 35 minutes.

Boiled Pigeons.—Boil them about 15 minutes by themselves; then boil a piece of bacon; serve with slices of bacon and melted butter.

Fish Chowder.—Fry a few slices of salt pork, dress and cut the fish in small pieces, pare and slice the potatoes and onions, then place them in the kettle, a layer of fish, then of the fried pork, potatoes, onions, &c., seasoning each layer with salt and pepper. Stew over a slow fire 30 minutes.

Roast Beef.—The sirloin is considered the best for roasting. Spit the meat, pepper the top, and baste it well while roasting with its own dripping, and throw on a handful of salt. When the smoke draws to the fire, it is near enough; keep the fire bright and clear. From 15 to 20 minutes to the lb., is the rule for roasting.

Beef Boiled.—The round is the best boiling piece. Put the meat in the pot, with water enough to cover it; let it boil very slow at first—this is the great secret of making it tender—take off the scum as it rises. From 2 to 3 hours, according to size, is the rule for boiling.

Beef Steak.—The inside of the sirloin makes the best steak; cut about ¾ of an inch thick—have the gridiron hot, put on the meat and set it over a good fire of coals—turn them often. From 8 to 10 minutes is the rule for broiling.

Roast Pork.—Take a leg of pork and wash it clean—cut the skin in squares—make a stuffing of grated bread, sage, onion, pepper and salt, moistened with the yolk of an egg. Put this under the skin of the knuckle, and sprinkle a little powdered sage into the rind where it is cut; rub the whole surface of the skin over with a feather dipped in sweet oil. 8 lbs. will require about three hours to roast it.

☞ The Shoulder, Loin, or Chine, and Spare-Rib are roasted in the same manner.

Roast Veal.—Pursue about the same course as in roasting pork. Roast before a brisk fire till it comes to a brown color; when you lay it down baste it well with good butter, and when near done, with a little flour.

Roast Mutton.—The loin, haunch, and saddle of mutton and lamb must be done the same as beef. All other parts must be roasted with a quick, clear fire; baste it when you put it down, and dredge it with a little flour, just before you take it up. A leg of mutton of six pounds will require 1 hour to roast before a quick fire.

To Boil Eggs.—In 3 minutes an egg will boil soft, in 4 the white part is completely cooked, in 10, it is fit for a salad. Try their freshness in cold water, those that sink the soonest are the freshest.

Sausage Meat.—Take 2 lbs. lean meat, 1 lb. fat-pork, chop fine, and mix with 2 teaspoonfuls of black pepper, 1 of cloves, 7 of powdered sage, and 5 of salt.

Apple Custard.—Take apples, pared, cored, and slightly stewed, sufficient to cover the dish, 8 eggs, 1 qt. of milk; spice to your taste; bake it ¼ of an hour.

New-England Apple-sauce or Butter.—Boil 2 brls. of new cider down to ½ a brl. Pare, core, and slice up 3 bushels of apples (sweet apples are preferable), and put them into the cider thus reduced, and still kept boiling briskly. Stir the whole mass constantly, to prevent burning, till of the consistence of soft butter. A small quantity of pulverized allspice, added during the boiling, is an improvement. Boil in a brass kettle, and, when done, put it into a wooden firkin, or small cask, and it will keep for years.

Apple Butter (*Pennsylvania Method*).—Boil new cider down to ½. Pare, cut, and core equal quantities of sweet and sour apples. Put the sweet apples in a large kettle to soften a little first, as they are the hardest. Add enough boiled cider to cook them. After boiling ½ an hour, stirring often, put in the sour apples, and add more boiled cider, with molasses enough to sweeten moderately. Boil until tender, stirring to prevent burning. Pack in firkins or stone pots for winter use.

Irish Stew.—Take 4 lbs. good breast of fat mutton, cut in small pieces; 2 large white onions; 10 large potatoes, well peeled and sliced; put all in saucepan together, with fine herbs, pepper and salt to suit; a little salt pork is a good addition; ½ lb. of flour; ¼ lb. good fresh butter, well rubbed together, and let it boil for one hour, and have it well cooked.

Apple Dumplings.—6 eggs, 1½ lbs. of flour, some butter to your taste, and tablespoonful of yeast, and sufficient milk to make a dough to roll-out; when raised, cut in small pieces, put in the apples, and cook for ¾ of an hour; serve with white sugar or wine sauce.

Boiled Poultry.—Take large chickens, well cleaned with cold water, put in saucepan with water to cover, boil 1 hour; served with sauce.

Hashed Turkey.—Take meat from boiled fowls, chop fine, put in saucepan, with seasoning to suit taste. Served on toast.

Boiled Maccaroni.—Take 2 lbs., break in small pieces, put in warm water to steep 1 hour, drain off, put in saucepan with 2 qts. fresh cream, with grated cheese; seasoned with red pepper.

Strasburg Potted Meat.—Take 1½ lbs. of the rump of beef, cut into dice, put it in an earthen jar, with ¼ lb. of butter, tie the jar close up with paper, and set over a pot to boil; when nearly done, add cloves, mace, allspice, nutmeg, salt, and cayenne pepper to taste, then boil till tender, and let it get cold, pound the meat, with 4 anchovies mashed and boned, add ¼ lb. of oiled butter, work it well together with the gravy, warm a little, and add cochineal to color, then press into small pots, and pour melted mutton suet over the top of each.

Bologna Sausages.—Take equal quantities of bacon, fat and lean, beef, veal, pork and beef suet; chop them small, season with pepper, salt, &c., with sweet herbs and sage rubbed fine. Have well washed intestines, fill, and prick them; boil gently for an hour, and lay on straw to dry.

Rich Sausages.—Take 30 lbs. of chopped meat, 8 oz. fine salt, 2½ oz. pepper, 2 tea cups of sage, and 1½ cups of sweet marjoram, passed through a fine sieve, or, if preferred, thyme and summer savory can be substituted for the latter.

How to save your Ice Bill.—Get a quantity of empty barrels or boxes during the coldest time in the winter, and put a few inches of water in each; the evening when the cold is most intense is the best time to do this. After the water is frozen solid, fill up again, repeat the process until the barrels are full of solid ice, then roll them into your cellar, cover them up with plenty of sawdust or straw, and your ice crop is safely harvested.

Charlotte Russe.—Take 1 pt. milk, dissolve with heat, 3 oz. isinglass and 1 lb. sugar; add, after it is cool, 1 qt. beaten cream and flour, suit your taste and line out some mould with sponge cake, and put the cream in it and cool.

Wine Jelly.—Take 1 pt. water and 3 oz. isinglass, 1¼ lb. sugar, the juice of 2 lemons, and dissolve that and let it come to a boil, then add wine, brandy and spice to your taste, and strain it through a cotton or flannel cloth and put it in moulds to cool.

To make Apple Molasses.—Take new sweet cider just from the press, made from sweet apples, and boil it down as thick as West-India molasses. It should be boiled in brass, and not burned, as that would injure the flavor. It will keep in the cellar, and is said to be as good, and for many purposes better, than West-India molasses.

☞ Acid fruits should be cooked in bright tin, brass, or bell metal, and poured out as soon as they are done. Brown earthen vessels should never be used, as they are glazed with white lead, a poison which very readily unites with an acid.

Jellies.—*Lemon Jelly.*—Isinglass, 2 oz.; water, 1 qt.; boil; add sugar, 1 lb.; clarify; and, when nearly cold, add the juice of 5 lemons, and the grated yellow rinds of 2 oranges and 2 lemons; mix well, strain off the peel, and put it into glasses or bottles; *Hartshorn Jelly.*—Hartshorn, 1 lb.; water 1 gal.; peel of 2 lemons; boil over a gentle fire till sufficiently thick; strain and add loaf sugar, ½ lb.; whites of 10 eggs beaten to a froth; juice of 6 lemons; mix well together, then bottle. *Isinglass Jelly.*—Put 4 oz. isinglass and 2 oz. cloves into 1 gal. water; boil it down to half a gal.; strain it upon 4 lbs. of loaf sugar; add, while cooling, a little wine; then bottle. *Apple Jelly from Cider.*—Take of apple juice, strained, 4 lbs.; sugar, 2 lbs.; boil to a jelly, and bottle. *Gooseberry Jelly.*—Sugar, 4 lbs.; water, 2 lbs.; boil together; it will be nearly solid when cold; to this syrup, add an equal weight of gooseberry juice; give it a short boil, cool, then pot it. *Currant Jelly.*—Take the juice of red currants, and loaf sugar, equal quantities; boil and stir gently for three hours; put it into glasses; and in three days it will concentrate into a firm jelly. *Tapioca Jelly.*—Wash 8 oz. of tapioca well; then soak it in 1 gal. fresh water, five or six hours; add the peels of 8 lemons, and set all on to heat; simmer till clear; add the juice of the 8 lemons with wine and sugar to taste; then bottle.

Scotch Short Bread.—Flour 2 pounds, butter 1 pound, brown sugar ½ pound, blanched almonds, cut small, ¼ pound, candied lemon peel, ¼ pound; beat the butter to a cream, and add it to the flour and sugar with the other ingredients. When well kneaded and incorporated roll it out into cakes about one inch thick. Bake in a moderate oven.

Gold Cake.—Yolks of 1 doz. eggs; flour, 5 cups; white sugar, and butter, of each, one cup; cream or sweet milk, 1 cup; cream of tartar, 1 teaspoon; soda, ½ teaspoon. Beat the eggs with the sugar; have the butter softened by the fire, then stir it in; put the soda and cream of tartar into the cream or milk, stirring up and mixing all together; then sift and stir in the flour.

Wonders.—2 pounds flour, ½ pound butter, ½ ounce sugar, 10 eggs, cinnamon.

Cookies.—3 pounds flour, ¾ pound butter, ¾ pound sugar, 3 eggs; or, without eggs, wet up, raise with saleratus and sour milk.

Common.—12 pounds flour, 3 pounds butter, 3 pounds sugar, 2 quarts milk, yeast, spice to taste.

Loaf.—9 quarts flour, 3 pounds butter, 4 pounds sugar, 1 gallon milk, wine 1 pint, yeast 1 pint.

Cider Cake.—Flour, 6 cups; sugar, 3 cups; butter, 1 cup; cider, 1 cup; saleratus, 1 teaspoon; 4 eggs; 1 grated nutmeg. Beat the eggs, sugar, and butter together, and stir in the flour and nutmeg; dissolve the saleratus in the cider, and stir into the mass, and bake immediately in a quick oven.

Molasses Cake.—Molasses, 1½ cups; saleratus, 1 teaspoon; sour milk, 2 cups; 2 eggs; butter, lard, or pork gravy, what you would take upon a spoon; if you use lard, add a little salt. Mix all by beating a minute or two with a spoon; dissolving the saleratus in the milk; then stir in flour to give it the consistency of soft cake and put directly into a hot oven, being careful not to dry by over baking.

Rock Cakes.—Mix together 1 lb. of flour; ½ lb. of sugar; ½ lb. of butter; ½ lb. of currants or cherries, and 4 eggs, leaving out the whites of 2; a little wine and candied lemon-peel are a great improvement.

Jumbles.—Take 1 lb. of loaf-sugar, pounded fine; 1¼ lb. of flour; ¾ lb. of butter; 4 eggs, beaten light, and a little rose-water and spice; mix them well, and roll them in sugar.

Cup Cakes.—Mix together 5 cups of flour; 3 cups of sugar; 1 cup of butter; 1 cup of milk; 3 eggs well beaten; 1 wine-glass of wine; 1 of brandy, and a little cinnamon.

Cymbals.—2 lbs. flour, 8 oz. butter, ½ lb. sugar, 6 eggs, rose-water and a little spice.

Frosting, or Icing, for Cakes.—The whites of 8 eggs, beat to a perfect froth and stiff; pulverized white sugar, 2 lbs.; starch, 1 tablespoon; pulverized gum arabic, ½ oz.; juice of 1 lemon; sift the starch, sugar and gum arabic into the beaten egg, and stir all thoroughly, when the cake is cold lay on the frosting to suit.

Jumbles.—Butter 1 lb., sugar 1 lb., flour 2 lbs., 3 eggs, ½ cup of *sour milk; 1 teaspoonful* of soda, roll in white coffee sugar. *This will make a large* batch.

Doughnuts.—Sugar and milk, 2 cups of each; saleratus, 1 teaspoonful; 3 eggs, and a piece of butter half as large as a small hen's egg, and flour sufficient.

Crullers.—Sugar and melted butter, 6 tablespoonfuls of each; 6 eggs, and flour to roll.

Buns.—1 cup butter, 1 cup sugar, ½ cup of yeast, ½ pint of milk; make it stiff with flour; add, if you like, nutmeg.

Cocoanut Drops.—1 lb. grated cocoanut, ½ lb. white sugar, the white of 6 eggs, cut to a stiff froth. You must have enough whites of egg to wet the whole mixture. Drop on buttered plates, in pieces the size of an egg.

French Rolls.—1 ounce of butter, 1 lb. of flour, 1 gill of home-made yeast, 1 egg, milk enough to make a dough. Rub the butter through the flour, beat the egg and stir in, then add the yeast, milk, and a little salt. Knead the dough; when it is light, mould it out into large biscuits, and bake them on tins.

Muffins.—A quart of milk, 2 eggs, 2 spoonfuls of yeast, 2 lbs. of flour, a lump of butter size of an egg—which is to be melted in the milk—and a little salt; the milk is to be warmed, and the ingredients added. Let it rise, and then turn the mixture into buttered pans, and bake to a light brown.

Bath Cakes.—Mix well together, 1 lb. flour, ½ lb. butter, 5 eggs, and a cupful of yeast, set the whole before the fire to rise; after it rises, add ¼ lb. white sugar, and 1 ounce carraway seeds well mixed in, and roll the paste into little cakes, bake them on tins.

No. 1 Crackers.—Butter, 1 cup; salt, 1 teaspoon; flour, 2 qts. Rub thoroughly together with the hand, and wet up with water; beat well, and beat in flour to make quite brittle and hard; then pinch off pieces, and roll out each cracker by itself.

Sugar Crackers.—Flour, 4 lbs.; loaf sugar and butter, of each ½ lb.; water, 1½ pts.; make as above.

Naples Biscuit.—White sugar, eggs, and flour, of each 4 lbs.

Lemon Biscuit.—Take 3½ lbs. white sugar, 4 lbs. flour, ½ ounce saleratus, ½ lb. suet, a little milk to wet the dough, cut them out about the size of marbles, put them on pans a little greased, and bake them in a hot oven and flavor them with essence of lemon.

Abernethy Biscuit.—Take 8 lbs. of flour, 1¼ lb. of butter, 1 quart of sweet milk, 12 ounces of sugar, 1 ounce of carraway seed, 6 eggs; mix dough of the above, break them in pieces of about two ounces, mould them off, roll them out, prick them and bake them in a moderate oven.

Savoy Biscuit.—Take of sugar the weight of 14 eggs, of flour the weight of 6 eggs, beat the yellows and whites of 12 eggs, separate, grate in the rind of a lemon; after being in the oven a few minutes grate on some sugar. You may add peach-water, or lemon-juice, or any flavoring extract.

Ginger Snaps.—Take 7 lbs. of flour, 1 quart of molasses, 1 lb. of brown sugar, 1 lb. butter, 2 ounces of ground ginger, and then take 1 gill of water, ¾ of an ounce of saleratus; mix them all into dough, and cut them out something larger than marbles, and bake them in a moderate oven.

York *Biscuit.*—*3 lbs. flour,* ½ lb. butter, ¾ lbs. sugar; wet up, and *raise with sour milk* and saleratus.

Traveller's Biscuit.—2 lbs. of flour, ¾ of a pound of sugar, ¼ lb. butter, 1 teaspoonful of *dissolved* saleratus, milk sufficient to form a dough. Cut up the butter in the flour, add the sugar, and put in the saleratus and milk together, so as to form dough. Knead it till it becomes perfectly smooth and light. Roll it in sheets about ⅛ of an inch thick, cut the cakes with a cutter or the top of a tumbler. Bake in a moderate oven.

Baking Powder for Biscuit.—Bicarbonate of soda 4 lbs., cream of tartar 8 lbs. These ingredients should be thoroughly dried and well mixed, and put up proof against dampness. Use about 3 teaspoonfuls to each quart of flour, mix up with cold water or milk, and put it into the oven at once.

Brown Bread for Biscuits.—Corn meal 4 qts., rye flour 3 qts., wheat flour 1 qt., molasses 2 tablespoonfuls, yeast 6 tablespoonfuls, soda 2 teaspoonfuls. Mix during the evening for breakfast.

Mince Pies—Meat 1 lb., suet 3¼ lbs., currants, raisins and plums, 2 lbs., one glass brandy or wine; allspice, cinnamon and cloves to your taste, sugar sufficient to sweeten. Baked in a short crust.

Fruit Pies.—For all kinds of fruit pies have your fruit sweetened to your taste, and then put in a short crust. Bake in a hot oven.

Pumpkin Pie.—Stew the pumpkin dry, and make it like squash pie, only season rather higher. In the country, where this *real Yankee pie* is prepared in perfection, ginger is almost always used, with other spices. There, too, part cream, instead of milk, is mixed with the pumpkin, which gives a richer flavor.

Lemon Pie.—1 lemon grated, 2 eggs, ½ cup of sugar, 1 cup of molasses, 1 of water, and 3 tablespoonfuls of flour. This makes 3 pies.

Lemon Pie with three crusts.—A layer of crust, a layer of lemon, sliced fine, a little sugar, layer of crust again, and sugar and lemon again, then the upper crust.

Another Way.—1 cup of sugar, 1 cup of sweet milk, 1 egg, 1½ lemon the grated peel and juice, 1 tablespoonful of flour; then after baking, the white of an egg beaten, sweetened, and put on the top; then set in the oven and browned.

Crumb Pie.—Mince any cold meat very finely, season it to taste, and put it into a pie-dish; have some finely-grated bread crumbs, with a little salt, pepper, and nutmeg, and pour into the dish any nice gravy that may be at hand; then cover it over with a thick layer of the bread crumbs, and put small pieces of butter over the top. Place it in the oven till quite hot.

Washington Pie.—1 cup of sugar, third of a cup of butter, half a cup of sweet milk, 1 and a third cup of flour, 1 egg, half a teaspoonful of soda, 1 of cream of tartar, lemon flavor, Grease 2 round tins, and put in the above. Bake until done. Then put it on a dinner plate, spread with nice apple-sauce, or sauce of any kind; then another layer of cake on top. It is nice without sauce, but sauce improves it.

Fruit Pie.—1 cup of sugar, 1 of water, tablespoonful of flour, teaspoonful of lemon essence (or lemon grated), 1 teaspoonful of cream of tartar, half a teaspoonful of soda, half a cup of dried currants: *mix and boil, stirring* to prevent the flour from settling.

Chicken Pie—Take one pair of good young chickens, cut in small pieces, season with pepper and salt and small strips of salt pork, put in saucepan with water to cover it, boil for half an hour, add flour and butter to thicken the gravy, have ready a large dish, served with paste, put all in the dish covered with a good rich paste. Bake for half an hour.

Veal Pot Pie.—Take 2 pounds of best veal, cut in small pieces, half pound of salt pork, sliced thin, four quarts of cold water; pepper and salt all, put on the fire; after boiling for 1 hour have 3 pounds of light bread dough, pick small pieces, say one ounce pieces, put in saucepan, with the veal and pork and let it boil for twenty minutes. Serve as soon as taken from the fire

Plum Pudding.—Pound 6 crackers, and soak them over night in milk enough to cover them, then add 3 pints of milk, 4 or 5 eggs, raisins ½ lb., spice with nutmeg and sweeten with sugar and molasses. Bake about 2 hours.

Tapioca Pudding.— Pick and mash a coffee cup full of tapioca, and pour upon it 1 pint boiling milk; after standing ½ an hour, add another pint of cold milk, with sugar and raisins if you desire.

Baked Pudding.— 5 tablespoonfuls of corn starch to 1 quart of milk, dissolve the starch in a part of the milk, heat the remainder of the milk to nearly boiling, having salted it a little, then add the dissolved starch to the milk, boil 3 minutes, stirring it briskly; allow it to cool, and then thoroughly mix with it 3 eggs, well beaten, with 3 tablespoonsfuls of sugar; flavor to your taste and bake it ½ an hour. This pudding ranks second to none.

Orange Pudding.—Take 1 lb. of butter, 1 lb of sugar, 10 eggs, the juice of 2 oranges, boil the peel, then pound it fine and mix it with the juice Add the juice of 1 lemon, a wineglassful of brandy, wine and rose-water. If you do not have the fruit add the extracts.

Cocoanut Pudding.—To a large grated cocoanut add the whites of 6 eggs, ½ lb of sugar, 6 ounces of butter, ½ a wineglassful of rose-water, and baked in or out of paste.

Rice Pudding.—Take 1 lb. of rice, boiled well with rich milk, stirring well until it is soft, and then add ½ lb. butter, 12 eggs, well beaten, and spice to your taste, and bake it.

Hard Times Pudding.—½ pint of molasses or syrup, ½ pint water, 2 teaspoonfuls of soda, 1 teaspoonful of salt, flour enough to make a batter; boil in a bag for 3 hours. Eat it with sauce.

Baked Apple Pudding.—Pare and quarter four large apples, boil them tender with the rind of a lemon in so little water that when done no water may remain, beat them quite fine in a mortar, add the crumb of a small roll, ¼ lb. of butter melted, the yolks of 5 and whites of 3 eggs, juice of ½ lemon, sugar to your taste, beat all well together, all in paste.

Ground Rice, or Sago Pudding.—Boil a large spoonful of it, heaped, in 1 pint milk with lemon peel and cinnamon; when cold add sugar, and nutmegs, and 4 eggs, well beaten.

Custard Pudding.—Take 1 pint milk, 4 spoonfuls flour, 6 eggs spice to your taste and bake.

Winter Pudding.—*Take the* crust of baker's loaf of bread, and *fill it with plums, boil it in* milk and water.

Baked Potatoe Pudding.—Baked potatoes skimmed and mashed 12 oz., suet 1 oz, cheese, grated fine, 1 oz., milk 1 gill. Mix the potatoes, suet, milk, cheese and all together, if not of a proper consistence, add a little water. Bake in an earthen pot.

College Puddings.—¾ lb of stale bread, grated; the same quantity of beef suet, chopped very fine; 1 lb. of currants, ½ nutmeg, a few cloves, a glass of brandy, 2 or 3 eggs, 2 spoonfuls of cream or milk; mix these well together, and make into a paste in the shape of eggs. Fry them gently over a clear fire, in ½ lb of butter; let them be of a nice brown color all over You may add blanched almonds and sweetmeats Serve them up with wine.

Family Pudding.—1 quart of sweet milk, 1 pint of bread crumbs soaked in the milk, 3 eggs well beaten, 1 teacupful of sugar, little mace, 6 good tart apples, pared, cores *dug* out, and stand them in the pudding, and steam until the apples are well done. An hour will suffice.

Cottage Pudding.—1 egg, 1 cup of sugar, 1 of sweet milk, 1 teaspoonful of soda, 2 of cream of tartar, 1 pint of flour, and a little salt. To be eaten with milk and sugar

Green Gooseberries make a nice pudding by stirring a pint of them into a pint of batter, and either baking or boiling.

Lemon Pudding.—Melt 6 oz. of butter, pour it over the same quantity of powdered loaf sugar, stirring it well till cold, then grate the rind of a large lemon, and add it with 8 eggs well beaten and the juice of 2 lemons: stir the whole till it is completely mixed together, and bake the pudding with a paste round the dish.

Sauces and Creams for Puddings.—1. Take equal quantities of sugar and molasses, boil them together, and stir in a little flour · 2 Take the juice of an orange, a cup of sugar and the same of good cream: 3 Good sour cream made very sweet with sugar, with or without seasoning, makes a good sauce: 4. Beat 2 eggs well, then add a cup of stewed apples and a cup of sugar.

Beef Steak with Onions—Prepare a rump steak by pounding it till quite tender, season with salt, pepper and fresh butter, put in the steak and fry it, when brown on one side turn over, do not let it scorch, when nicely done, take it up, put a little flour over the steak, then add gradually a cup of hot water, seasoned with more salt and pepper, if necessary; then put the water over the fire and boil again, and pour over the steak.

Peel 2 dozen onions, put them on to boil with about 2 quarts of water an hour before the steak is put on to fry. When the steak is done, cut them up, put them in the frying pan, season well with salt, pepper, and butter, sprinkle with flour, stir all well together, place over the fire, stir often to prevent scorching; when they are a little brown and soft, turn them over the steak

Seasoning for Stuffing.—1 lb. of salt, dried and sifted; half an ounce of ground white pepper; two ounces of dried thyme; 1 oz. of dried marjoram; and one oz of nutmeg. When this seasoning is used, parsley only is required to be chopped in sufficient quantity to make the stuffing green. The proportions are—¾ pound of bread crumbs; 3 eggs; ¼ lb. of suet; ½ oz. of seasoning; and the peel of half a lemon, grated.

Economical Soup.—Put into a saucepan one-pound pieces of stale bread, three large onions sliced, a small cabbage cut fine, a carrot and turnip, and a small head of celery (or the remains of any cold vegetables), a tablespoonful of salt, a tablespoonful of pepper, a bunch of parsley, a sprig of marjoram and thyme Put these into two quarts of any weak stock, (the liquor in which mutton has been boiled will do,) and let them boil for two hours; rub through a fine hair-sieve, add a pint of new milk, boil up, and serve at once.

Vegetable Soup.—Take a shin of beef, 3 large carrots, 3 large yellow onions, 6 turnips, ½ pound of rice or barley; parsley, leeks, summer savory; put all into a soup-kettle, and let it boil four hours; add pepper and salt to taste; serve altogether. It makes a good family soup.

Pea Soup.—Beet 5 lbs., water 5 qts., 6 large carrots, 6 good turnips, 3 large onions, salt sufficient, put it on a good slow fire, let it boil 3 hours, then strain all the broth from meat and vegetables, and then add 3 lbs. of split peas to the broth; set it on a slow fire for 2 hours, stirring often, so that all the peas will dissolve; take 1 lb. fresh sausage meat, fried to a crisp and fried bread crumbs ; put all together, add a few fine herbs, and serve hot.

Fricassee Chickens.—Take 2 large young chickens, cut in small pieces, put in cold water for 1 hour to take all the blood out, then put in saucepan to parboil for half an hour, then take from saucepan drained well, have ready 1 qt. good fresh cream, 2 oz. good butter, 1 oz. of flour, all well mixed together; put in saucepan with the chickens; put on the fire to boil tender; season with pepper and salt; served with toast bread in the bottom of the dish.

Baked Tomatoes.—Wash the tomatoes, take out the seed, make a dressing of crumbs of bread and onions chopped fine ; add salt, butter and pepper. Bake and serve hot.

Stewed Tomatoes.—Scald the tomatoes with hot water, take off the skins, put them in an earthen vessel, strain off the water and add butter, salt and pepper to taste.

Mashed Turnips.—Wash turnips, boil well, take them up in the colander, press out all the water, mash very fine; season with salt, butter and sugar. Serve hot with trimmings.

Hashed Meat.—Take 2 lbs of fat corned beef, well boiled and cold; 1 lb. of well boiled potatoes, cold; 1 large white onion; put in chopping tray, mince it fine, put all in saucepan together, add 2 ozs. butter; pepper and salt to taste; add boiling water to make it soft; set it on a slow fire, stirring it often. When well stewed serve hot It makes a fine relish for breakfast.

Lobster Salad.—Take inside of large lobster, mince fine, take yolk of 2 eggs boiled hard and mashed fine, with four tablespoonfuls of sweet oil; pepper, salt, vinegar, and mustard to taste; mix well; add celery or lettuce to taste; then when serving, garnish with hard-boiled eggs.

Succotash.—Take 1 doz. ears of corn, cut the grains from the cob, add 1 qt. of Lima beans, and mix with the corn; put it on to boil in 3 qt. of water with 1 lb. of pork cut; add black pepper and salt to taste. When the water has boiled away to ½ the original quantity, serve in a tureen as soup.

Maccaroni Soup.—4 lbs. of lean beef, 4 qts. of water, carrot, turnip, onions; set it for 4 hours till all mix together; strain it all through a sieve; have 2 lbs. of maccaroni broken into pieces of one inch long; put all into a saucepan together, and let it boil for 10 minutes, and serve it hot.

Boiled Custard, or Mock Cream.—Take 2 tablespoonfuls of corn starch, 1 qt. of milk, 2 or 3 eggs, ½ a teaspoonful of salt and a small piece of butter; heat the milk to nearly boiling and add the starch, previously dissolved in 1 qt. of milk, then add the eggs, well beaten, with 4 tablespoonfuls of powdered sugar; let it boil up once or twice, stirring it briskly, and it is done. Flavor with lemon or vanilla, or raspberry, or to suit your taste.

Lemon Cream.—Take a pint of thick cream and put to it the yolks of two eggs, well beaten, 4 oz. of fine sugar and the thin rind of a lemon; boil it up, then stir till almost cold; put the juice of a lemon in a dish or bowl and pour the cream upon it, stirring till quite cold.

Fruit Creams.—Take ½ oz. of isinglass dissolved in a little water, then put 1 pt. of good cream, sweetened to the taste; boil it When nearly cold lay some apricot or raspberry jam on the bottom of a glass dish and pour it over This is most excellent.

Raspberry Cream.—Put 6 ozs. of raspberry jam to 1 qt. of cream, pulp it through a lawn sieve, add to it the juice of a lemon and a little sugar, and whisk it till thick. Serve it in a dish or glasses.

To roast fowls the fire must be quick and clear. If smoky, it will spoil both their taste and looks Baste frequently, and keep a white paper pinned on the breast till it is near done

Turkey.—A good sized turkey should be roasted 2½ hours or 3 hours—very slowly at first. If you wish to make plain stuffing, pound a cracker or crumble some bread very fine, chop some raw salt pork very fine, sift some sage, (and summer-savory, or sweet-marjoram, if you have them in the house, and fancy them,) and mould them all together, seasoned with a little pepper. An egg worked in makes the stuffing cut better

Boiled Turkey.—Clean the turkey, fill the crop with stuffing, and sew it up. Put it over the fire in water enough to cover it, let it boil slowly—take off all the scum When this is done, it should only simmer till it is done. Put a little salt into the water, and dredge the turkey with flour before boiling.

Roast Ducks and Geese.—Take sage, wash and pick it, and an onion; chop them fine, with pepper and salt, and put them in the belly, let the goose be clean picked, and wiped dry with a cloth, inside and out; put it down to the fire, and roast it brown. Ducks are dressed in the same way. For wild ducks, teal, pigeons, and other wild fowl, use only pepper and salt, with gravy in the dish.

Roast Chicken.—Chickens should be managed in roasting the same as turkeys, only that they require less time. From an hour to an hour and a half is long enough.

Boiled Chicken.—A chicken should be boiled the same as a turkey, only it will take less time—about 35 minutes is sufficient. Use the same stuffing, if any, and serve it up with parsley, or egg-sauce.

Broiled Chicken.—Slit them down the back and season with pepper and salt; lay them on a clear fire of coals, the inside next the fire till half done, then turn, and broil to a fine brown color. Broil about 35 minutes.

Boiled Pigeons.—Boil them about 15 minutes by themselves; then boil a piece of bacon; serve with slices of bacon and melted butter.

Fish Chowder.—Fry a few slices of salt pork, dress and cut the fish in small pieces, pare and slice the potatoes and onions, then place them in the kettle, a layer of fish, then of the fried pork, potatoes, onions, &c., seasoning each layer with salt and pepper. Stew over a slow fire 30 minutes.

Roast Beef.—The sirloin is considered the best for roasting. Spit the meat, pepper the top, and baste it well while roasting with its own dripping, and throw on a handful of salt. When the smoke draws to the fire, it is near enough; keep the fire bright and clear. From 15 to 20 minutes to the lb., is the rule for roasting.

Beef Boiled.—The round is the best boiling piece. Put the meat in the pot, with water enough to cover it; let it boil very slow at first—this is the great secret of making it tender—take off the scum as it rises. From 2 to 3 hours, according to size, is the rule for boiling.

Beef Steak.—The inside of the sirloin makes the best steak; cut about ¾ of an inch thick—have the gridiron hot, put on the meat and set it over a good fire of coals—turn them often. From 8 to 10 minutes is the rule for broiling.

Roast Pork.—Take a leg of pork and wash it clean—cut the skin in squares—make a stuffing of grated bread, sage, onion, pepper and salt, moistened with the yolk of an egg. Put this under the skin of the knuckle, and sprinkle a little powdered sage into the rind where it is cut; rub the whole surface of the skin over with a feather dipped in sweet oil. 8 lbs. will require about three hours to roast it.

☞ The Shoulder, Loin, or Chine, and Spare-Rib are roasted in the same manner.

Roast Veal.—Pursue about the same course as in roasting pork. Roast before a brisk fire till it comes to a brown color; when you lay it down baste it well with good butter, and when near done, with a little flour.

Roast Mutton.—The loin, haunch, and saddle of mutton and lamb must be done the same as beef. All other parts must be roasted with a quick, clear fire; baste it when you put it down, and dredge it with a little flour, just before you take it up. A leg of mutton of six pounds will require 1 hour to roast before a quick fire.

To Boil Eggs.—In 3 minutes an egg will boil soft, in 4 the white part is completely cooked, in 10, it is fit for a salad. Try their freshness in cold water, those that sink the soonest are the freshest.

Sausage Meat.—Take 2 lbs. lean meat, 1 lb. fat-pork, chop fine, some of the cummin on his nose, give him a little of the castor on anything he likes, and get eight or ten drops oil rhodium on his tongue. You can then get him to do anything you like. Be kind and attentive to the animal, and your control is certain.

Best Remedy for Heaves.—Balsam of fir and balsam of copaiba, 4 oz. each, and mix with calcined magnesia sufficiently thick to make it into balls; and give a middling-sized ball night and morning for a week or ten days.

Cure for Bots in Horses.—Give the horse, first, 2 quarts of new milk, and 1 quart molasses; 15 minutes afterwards, give 2 quarts very strong sage tea; 30 minutes after the tea, give 3 pints (or enough to operate as physic), of curriers' oil. The molasses and milk cause the bots to let go their hold, the tea puckers them up, and the oil carries them completely away. Cure certain, in the worst cases.

Certain Ring-bone and Spavin Cure.—Venice turpentine and Spanish flies, of each 2 oz.; euphorbium and aqua-ammonia, of each 1 oz.; red precipitate, ½ oz.; corrosive sublimate, ¼ oz.; lard, 1½ lbs. Pulverize all, and put into the lard; simmer slowly over coals, not scorching or burning; and pour off, free of sediment. For ring-bones, cut off the hair, and rub the ointment well into the lumps once in 48 hours. For spavins, once in 24 hours for 3 mornings. Wash well previous to each application with suds, rubbing over the place with a smooth stick, to squeeze out a thick, yellow matter. This has removed very large ring-bones.

Bone Spavins, French Paste.—$300 Recipe.—Corrosive sublimate, quicksilver, and iodine, of each 1 oz. Rub the quicksilver and iodine together; then add the sublimate, and lastly the lard, rubbing them thoroughly. Shave off the hair the size of the bone enlargement; grease all around it, but not where the hair is shaved off; this prevents the action of the medicine, except on the spavin. Then rub in as much of the paste as will lie on a 3 cent piece, each morning, for 3 or 4 mornings. In from 7 to 8 days, the whole spavin will come out; then wash the wound with suds for an hour or so, to remove the poisonous effects of the paste; afterwards heal up the sore with any good healing salve, or Sloan's Horse Ointment, as per recipe above, keeping the sore covered while it is healing up

Another very Valuable Recipe for Ring-Bone.—Pulverized cantharides, oils of spike, origanum, amber, cedar, Barbadoes tar, and British oil, of each 2 oz; oil of wormwood, 1 oz.; spirits turpentine, 4 oz.; common potash, ½ oz.; nitric acid, 6 oz.; sulphuric acid, 4 oz.; lard, 3 lbs. Melt the lard, and slowly add the acids; stir well, and add the other articles, stirring till cold; clip off the hair, and apply by rubbing and heating in. In about 3 days, or when it is done running, wash off with soap-suds, and apply again. In old cases, it may take 3 or 4 weeks; but, in recent cases, 2 or 3 applications have cured.

Another.—Pulverized cantharides, oils of origanum and amber, and spirits turpentine, of each 1 oz.; olive oil, ½ oz.; sulphuric acid, 3 drams; put all, except the acid, into alcohol; stir the mixture, add the acid slowly, and continue to stir till the mixture *ceases to smoke*; then bottle for use. Apply to ring-bone or spavin with a sponge tied on the end of a stick, as long as it is absorbed into the parts; twenty-four hours after, grease well with lard; and in twenty-four hours more, wash off well with soap-suds. One application is generally sufficient for spavins, but may need two; ring-bones, always two or three applications, three or four days apart, which prevents loss of hair. This will stop all lameness, but does not remove the lump.

Splint and Spavin Liniment.—Oil of origanum, 6 oz.; gum camphor, 2 oz.; mercurial ointment, 2 oz.; iodine ointment, 1 oz.; melt by putting all into a wide-mouthed bottle, and setting it in a kettle of hot water. Apply it to bone spavins or splints, twice daily, for four or five days, and a cure is guaranteed.

Liniment for Sweeny.—Alcohol and spirits turpentine, of each, 8 oz.; camphor-gum, pulverized cantharides, and capsicum, of each 1 oz.; oil of spike, 3 oz.; mix. Bathe this liniment in with a hot iron, and a certain cure is sure to follow.

For Looseness or Scouring in Horses or Cattle.—Tormentil root, powdered. Dose for a horse or cow, 1 to 1½ oz. It may be stirred into 1 pint of milk, and given; or it may be steeped in 1½ pints of milk, then given from three to six times daily, until cured.

Scours and Pin-Worms in Horses and Cattle.—White-ash bark burnt into ashes, and made into a rather strong lye; then mix ½ pint of it with 1 pint warm water, and give all two or three times daily. This will certainly carry off the worms, which are the cause, in most instances, of scours and looseness.

English Stable Liniment, very strong.—Oil of spike, aqua-ammonia, and oil of turpentine, each 2 oz.; sweet oil, and oil of amber, each 1½ oz.; oil of origanum, 1 oz. Mix.

Colic Cure for Horses and Persons.—Spirits turpentine, 3 oz.; laudanum, 1 oz.; mix; and for a horse give all for a dose, by putting it into a bottle with half a pint of warm water. If relief is not obtained in an hour, repeat the dose, adding half an ounce of the best powdered aloes, well dissolved. Cure, certain.

For Persons, a dose would be from 1 to 2 teaspoonfuls in warm tea; children or weak persons, less.

Liniment for fifty cents per gallon.—Best vinegar, 2 quarts; pulverized saltpetre, ½ lb.; mix, and set in a cool place till dissolved. Invaluable for old swellings, sprains, bruises, &c.

Shoeing Horses.—A smith who shod for the hunt, and who said that he would have to shut up shop if a shoe was lost, as it might cause the loss of a horse worth a thousand pounds, fastened the shoe as follows:—As he drove the nails, he merely bent the points down to the hoof, without twisting them off, as the usual practice is; he then drove the nails home, and clinched them. He then twisted off the nails, and filed them lightly to smooth them, thus having, as he remarked, a clinch and rivet to hold the nails.

Horse Ail.—Make a slow fire of old shoes, rags, herbs, &c. When fired a little, smother so as to make a great smoke and steam; then set a barrel without heads, over the fire, and hold the horse's head down in the barrel, and smoke him well. This will soon produce a copious running at the nose, and he will be so well pleased that he will voluntarily hold his head in the smoke. Continue this *half an hour or more daily*, meanwhile give him potatoes and warm bran mashes, and gentle physic, if there be much costiveness which the laxative food will not remove. If he has much fever treat him for that.

Saddle and Harness Galls, &c.—White lead and linseed oil, mixed as for paint, is almost unrivalled for healing saddle, harness, or collar galls and bruises. Try it, applying with a brush. It soon forms an air-tight coating and soothes the pain, powerfully assisting nature.

Grease Heel.—Lye made from wood-ashes, and boil white-oak bark in it till it is quite strong, both in lye and bark-ooze; when it is cold, it is fit for use. Wash off the horse's legs with Castile soap; when dry, apply the above lye with a swab fastened on a long stick to keep out of his reach, as the smart caused by the application might make him let fly without much warning; but it is a sure cure, only it brings off the hair. To restore the hair after the cure is effected, make and apply a salve by stewing elder bark in old bacon; then form the salve by adding a little resin, according to the amount of oil when stewed, or ¼ lb. resin to each pound of oil.

Valuable Remedy for Heaves.—Calcined magnesia, balsam of fir, balsam copaiba, of each 1 oz.; spirits turpentine, 2 oz.; put them all into 1 pint best cider vinegar; give for a dose, 1 tablespoonful in his feed, once a day for a week; then every other day for 2 or 3 months. Wet his hay with brine, and also his other feed. He will cough more at first, but looser and looser till cured.

To Distinguish and cure Distemper.—Wet up bran with rather strong lye; if not too strong, the horse will eat it greedily. If they have the distemper, a free discharge from the nostrils, and a consequent cure, will be the result, if continued a few days; but, if only a cold, with swellings of the glands, no change will be discovered.

Remedy for Founder.—Draw about 1 gallon blood from the neck; then drench the horse with linseed oil, 1 quart; now rub the fore-legs long and well with water as hot as can be borne without scalding.

Physic-Ball for Horses.—Barbadoes aloes, from 4 to 5 or 6 drams (according to size and strength of the horse); tartrate of potassa, 1 dram; ginger and Castile soap, each, 2 drams; oil of anise, or peppermint, 20 drops; pulverize and make all into one ball, with thick gum solution. Feed by giving scalded bran instead of oats, for two days before giving the physic, and during its operation.

Physic for Cattle.—Take *half* only of the dose above for a horse, and add to it glauber-salts, 8 oz.; dissolve all in gruel, 1 quart, and give as a drench.

Hoof-ail in Sheep.—Muriatic acid and butter of antimony, of each 2 oz.; white vitriol, pulverized, 1 oz.; mix. Lift the foot, and drop a little of it on the bottom, only once or twice a week. It kills the old hoof, and a new one soon takes its place.

To Cultivate Tobacco.—To raise tobacco, select a sheltered situation, where the young plants can receive the full force of the sun; burn over the surface of the ground early in spring (new land is best), rake it well, and sow the seeds: have a dry, mellow,

il, and after a shower, when the plants have got leaves the
a quarter-dollar, transplant as you would cabbage plants, 3½
art, and weed out carefully afterwards. Break off the
s from the foot-stalks, as they appear; also the tops of
nts when they are well advanced,—say, about 3 feet high,
t those designed for seed, which should be the largest
st plants. The ripeness of tobacco is known by small
spots appearing on the leaves. The plants should then be
ar the roots, on the morning of a day of sunshine, and
lie singly to wither. When sufficiently withered, place the
in close heaps, under cover, to sweat 48 hours or more;
ng them up under cover to dry.

Reserve Potatoes from Rot.—Dust over the floor of the
h lime, and put in about 6 or 7 inches of potatoes, and dust
me as before, then more potatoes, using about 1 bushel of
40 bushels of potatoes. The lime improves the flavor of
atoes, and effectually kills the fungi which causes the rot.
ld veteran farmer, with 63 years' experience, has success-
ught the potatoe rot *in the ground*, as follows. He plants
the latter part of April, or beginning of May, and in the
the moon. When six inches high, they are plastered and
out nicely. Now for the secret. When blossoming, take 2
laster, and 1 part fine salt, mix well together, and put 1
poonful of this compound as near the centre of each hill
ible. When ripe, take them out of the ground, have them
en put in the cellar, and keep them in a dry, cool place.

ing Fruits for Long Distances.—Take a box of the proper
ft paper, and sweet bran. Place a layer of bran on the
, then each bunch of grapes is held by the hand over a
f the paper; the four corners of the paper are brought up
stalk and nicely secured; then laid on its side in the box,
on until the first layer is finished. Then dust on a layer of
iving the box a gentle shake as you proceed. Begin the
layer as the first, and so on until the whole is full. The
of the fruit is thus preserved as fresh at the end of a
of 500 miles as if they were newly taken from the tree.
fails to preserve grapes, peaches, apricots and other fruit.

prout Onions.—Pour hot water on the seed, let it remain 2
conds, and they will immediately sprout, and come up
arlier.

enew Old Orchards.—Early in the spring, plough the
rchard, and enrich the whole soil with a good dressing of
t of manure, swamp-muck, and lime; scrape off the old
ith a deck-scraper, or a sharp hoe; apply half a bushel of
nd the same of ground charcoal round each tree. Then
iluted soft soap, or strong soap-suds, on the trunks and
as high as a man can reach. When the trees are in full
throw over them a good proportion of fine slacked lime,
u will reap abundant fruits from your labors.

estroy the Moth or Miller.—Dr. Waterman says, "I took
hite dishes (because white attracts their attention in the
or deep plates, and placed them on the top of the hives,
led them about half-full of sweetened vinegar. The next

morning I had about 50 millers caught; the second night I caught 50 more; the third night, being cold, I did not get any; the fourth night, being very warm, I caught about 400; the fifth night I got about 200."

To Keep Milk Sweet, and Sweeten Sour Milk.—Put into the milk a small quantity of carbonate of magnesia.

To make Cheap and Good Vinegar.—To eight gallons of clear rain-water, add 6 quarts of molasses; turn the mixture into a clean, tight cask, shake it well two or three times, and add 1 pt. of good yeast. Place the cask in a warm place, and in ten or fifteen days add a sheet of common wrapping-paper, smeared with molasses, and torn into narrow strips; and you will have good vinegar. The paper is necessary to form the "mother," or life of the liquor.

Mr. Culley's Red Salve, to cure the Rot in Sheep.—Mix 4 oz. of the best honey, 2 oz. of burnt alum reduced to powder, and ½ a pound of Armenian bole, with as much train or fish oil as will convert these ingredients into the consistence of a salve. The honey must first be gradually dissolved, when the Armenian bole must be stirred in; afterwards the alum and train-oil are to be added.

To improve the Wool of Sheep, by Smearing.—Immediately after the sheep are shorn, soak the roots of the wool that remains all over with oil, or butter, and brimstone; and, 3 or 4 days afterward, wash them with salt and water. The wool of next season will not be much finer, but the quantity will be in greater abundance. It may be depended upon, that the sheep will not be troubled with the scab or vermin that year. Salt water is a safe and effectual remedy against maggots.

To Mark Sheep without injury to the Wool.—To 30 spoonfuls of linseed oil, add 2 oz. of litharge, and 1 oz of lampblack; boil all together, and mark the sheep therewith.

To Prevent the Fly in Turnips.—From experiments lately made, it has been ascertained that lime sown by hand, or distributed by a machine, is an infallible protection to turnips against the ravages of this destructive insect. It should be applied as soon as the turnips come up, and in the same daily rotation in which they were sown. The lime should be slacked immediately before it is used, if the air be not sufficiently moist to render that operation unnecessary.

Coloring for Cheese.—The coloring for cheese is, or at least should be, Spanish annotto; but, as soon as coloring became general in this country, a color of an adulterated kind was exposed for sale in almost every shop. The weight of a guinea and a half of real Spanish annotto is sufficient for a cheese of fifty pounds' weight. If a considerable part of the cream of the night's milk be taken for butter, more coloring will be requisite. The leaner the cheese is, the more coloring it requires. The manner of using annotto is to tie up in a linen rag the quantity deemed sufficient, and put it into ½ pt. of warm water over night. This infusion is put into the tub of milk in the morning with the rennet infusion; dipping the rag into the milk, and rubbing it against the palm of the hand as long as any color runs out. The yolk of egg will *color butter.*

COMPOSITION FOR DRIVING OUT RATS, ETC.—Keep on hand a quantity of chloride of lime. The whole secret consists in scattering it dry all around their haunts and into their holes, and they will leave at once, or a liberal decoction of coal tar placed in the entrance of their holes will do as well.

HOW TO FORM SPRINGS.—The finest springs can be made by boring, which is performed by forcing an iron rod into the earth by its own weight, turning it round, and forcing it up and down by a spring-pole contrivance. The water will sometimes spout up several feet above the surface. Lead pipes are put down in the hole after the water is found. Depressed situations, having a southern exposure, with rising ground towards the north, are the best situations in the United States or the Canadas to find water.

TO BURN LIME WITHOUT A KILN.—Make a pyramidal pile of large limestones, with an arched furnace next the ground for putting in the fuel, leaving a narrow vent or funnel at the top; now cover the whole pile with earth or turf, in the way that charcoal heaps are covered, and put in the fire. The heat will be more completely diffused through the pile, if the aperture in the top is partially closed. Produces a superior article of lime.

EYE WATER FOR HORSES AND CATTLE.—Alcohol, 1 tablespoonful; extract of lead, 1 teaspoonful; rain water, ½ pint.

TO DESTROY MOSS ON TREES.—Paint them with white-wash made of quick lime and wood ashes.

TO PROTECT FRUIT-TREES FROM ATTACK OF MICE, ETC.—Tar, 1 part; tallow, 3 parts; mix. Apply hot to the bark of the tree with a paint brush.

TO PREVENT DECAY OF FARM IMPLEMENTS.—When not in use, have them sheltered from the sun, wind, rain, and snow. By this means, sleighs, waggons, carts, ploughs, threshing-machines, harrows, and the like, would last twice as long as they would if left in the open air, swelling from moisture one week, and shrinking the next, from the influence of the sun and wind.

OILING OR CLEANING OLD CARRIAGE-TOPS.—Enamel leather-tops should be first washed with Castile soap and warm water, then oiled with neat's foot oil; or sweet oil and a coat of enamel varnish put on, the leather will look like new. Dashes may be cleaned in the same manner, but varnish color is not very beneficial to patent leather; however, when old and cracked, it may be colored to improve the appearance.

DYERS, BLEACHERS, AND CLOTHIERS' DEPARTMENT.

DYEING.—It may be necessary to remark, and I do it here once for all, that every article to be dyed, as well as everything used about dyeing, should be perfectly clean.

In the next place, the article to be dyed should be well scoured in soap, and then the soap rinsed out. It is also an advantage to dip the article you wish to dye into warm water, just before putting it into the alum or other preparation; through neglect of this precaution, it is nothing uncommon to have the goods, or yarn spotted. *Soft* water should always be used if possible, and sufficient to cover the goods handsomely.

As soon as an article is dyed it should be aired a little, then well rinsed, and afterwards hung up to dry.

When dyeing or scouring silk or merino dresses, care should be taken not to wring them; for this has a tendency to wrinkle and break the silk.

In putting the dresses and shawls out to dry, that have been dyed, they should be hung up by the edge so as to dry evenly.

CHROME BLACK.—FOR WOOLLEN GOODS.—For 5 lbs. of goods, blue vitriol, 6 oz.; boil it a few minutes; then dip the goods ¾ of an hour, airing often; take out the goods, and make a dye with logwood, 3 lbs.; boil ½ hour; dip ¾ of an hour, and air the goods, and dip ¾ of an hour more. Wash in strong suds. This will not impart any of its color in fulling, nor fade by exposure to the sun.

BLACK ON WOOL.—FOR MIXTURES.—For 10 lbs. of wool, bichromate of potash, 4 oz.; ground argal, 3 oz.; boil together, and put in the wool; stir well, and let it remain in the dye 4 hours. Then take out the wool, rinse it slightly in clear water; then make a new dye, into which put logwood, 3½ lbs. Boil 1 hour, and add chamber-lye, 1 pt., and let the wool lie in all night. Wash in clear water.

STEEL MIXED.—DARK.—Black wool, it may be natural or colored, 10 lbs.; white wool, 1½ lbs. Mix evenly together, and it will be beautiful.

SNUFF BROWN.—DARK, FOR CLOTH OR WOOL.—For 5 lbs. goods, camwood, 1 lb.; boil it 15 minutes, then dip the goods for ¾ of an hour; take out the goods, and add to the dye, fustic, 2½ lbs.; boil 10 minutes, and dip the goods ¾ hour; then add blue vitriol. 1 oz.; copperas, 4 oz.; dip again ½ hour; if not dark enough, add more copperas. It is dark and permanent.

WINE COLOR.—For 5 lbs. goods, camwood, 2 lbs.; boil 15 minutes; then dip the goods for ½ hour; boil again, and dip ½ hour; then darken with blue vitriol, 1½ oz.; if not dark enough, add copperas, ½ oz.

MADDER RED.—To each lb. of goods, alum, 5 oz.; red, or cream of tartar, 1 oz.; put in the goods, and bring your kettle to a boil for ½ an hour; then air them, boil ½ hour longer; then empty your kettle, and fill with clean water; put in bran, 1 pk.; make it milk warm, and let it stand until the bran rises; then skim off the bran, and put in madder, ½ lb.; put in your goods, and heat slowly until it boils and is done. Wash in strong suds.

GREEN.—ON WOOL OR SILK, WITH OAK BARK.—Make a strong yellow dye of yellow oak and hickory bark in equal quantities. Add the extract of indigo, or chemic (which see), 1 tablespoon at a time, until you get the shade of color desired.

GREEN.—WITH FUSTIC.—For each lb. of goods, fustic, 1 lb.: with alum, 3½ oz. Steep until the strength is out, and soak the goods therein until a good yellow is obtained; then remove the chips, and add extract of indigo or chemic, 1 tablespoon at a time, until the color suits.

Blue.—Quick Process.—For 2 lbs. of goods, alum, 5 oz.; cream of tartar, 3 oz.; boil the goods in this for 1 hour; then throw the goods into warm water, which has more or less of the extract of indigo in it, according to the depth of color desired, and boil again until it suits, adding more of the blue if needed. It is quick and permanent.

Stocking-yarn, or Wool to color.—Between a Blue and Purple.—For 5 lbs. of wool, bichromate of potash, 1 oz.; alum, 2 oz.; dissolve them, and bring the water to a boil, putting in the wool, and boiling 1 hour; then throw away the dye, and make another dye with logwood chips, 1 lb.; or extract of logwood, 2½ oz.; and boil 1 hour. This also works very prettily on silk.

N.B.—Whenever you make a dye with logwood chips, either boil the chips ½ an hour and pour off the dye, or tie up the chips in a bag, and boil with the wool or other goods; or take 2½ oz. of the extract in place of 1 lb. of the chips; this is less trouble, and generally the better plan. In the above recipe, the more logwood that is used the darker will be the shade.

Scarlet with Cochineal.—For Yarn or Cloth.—For 1 lb. of goods, cream of tartar, ½ oz.; cochineal, well pulverized, ¼ oz.; muriate of tin, 2½ oz.; then boil up the dye, and enter the goods; work them briskly for 10 or 15 minutes, after which boil 1½ hours, stirring the goods slowly while boiling; wash in clear water and dry in the shade.

Pink.—For 3 lbs. of goods, alum, 3 oz.; boil and dip the goods 1 hour; then add to the dye, cream of tartar, 4 oz.; cochineal, well pulverized, 1 oz.; boil well, and dip the goods while boiling, until the color suits.

Orange.—For 5 lbs. goods, muriate of tin, 6 tablespoons; argal, 4 oz.; boil and dip 1 hour; then add to the dye, fustic, 2½ lbs.; boil 10 minutes, and dip ¼ hour; and add again to the dye, madder, 1 teacup; dip again ½ hour.

N.B.—Cochineal, in place of madder, makes a much brighter color, which should be added in small quantities until pleased. About 2 oz.

Lac Red.—For 5 lbs. goods, argal, 10 oz.; boil a few minutes; then mix fine ground lac, 1 lb., with muriate of tin, 1¼ lbs.; and let them stand 2 or 3 hours; then add half of the lac to the argal dye, and dip ½ hour; then add the balance of the lac, and dip again 1 hour, keep the dye at a boiling heat, until the last half hour, when the dye may be cooled off.

Purple.—For 5 lbs. goods, cream of tartar, 4 oz.; alum, 6 oz.; cochineal, well pulverized, 2 oz.; muriate of tin, ½ teacup. Boil the cream of tartar, alum, and tin, 15 minutes; then put in the cochineal, and boil 5 minutes; dip the goods 2 hours; then make a new dye with alum, 4 oz.; Brazil wood, 6 oz.; logwood, 14 oz.; muriate of tin, 1 teacup, with a little chemic; work again until pleased.

Silver Drab.—Light.—For 5 lbs. goods, alum, 1 small teaspoon, and logwood about the same amount; boil well together, then dip the goods 1 hour; if not dark enough, add in equal quantities alum and logwood, until suited.

Slate on Woollen or Cotton.—With Beech Bark.—Boil the bark in an iron kettle, skim out the chips after it has boiled sufficiently, and then add copperas to set the dye. If you wish it very dark, add more copperas. This is excellent for stockings.

Extract of indigo or Chemic.—To Make.—For good chemic or extract of indigo, take of vitriol, ½ lb., and stir it into indigo, finely ground, 2 oz., continuing the stirring at first for ½ hour; now cover over, and stir 3 or 4 times daily for 2 or 3 days; then put in a crumb of saleratus, and stir it up, and, if it foams, put in more and stir, and add as long as it foams; the saleratus neutralizes any excess of acid; then put into a glass vessel, and cork up tight. It improves by standing. Druggists keep this prepared.

Wool.—To cleanse.—Make a liquid of water, 8 parts, and urine, 1 part; heat it as hot as you can bear the hand in it; then put in the wool, a little at a time, so as not to have it crowd; let it remain in for 15 minutes; take it out over a basket to drain; then rinse in running water, and spread it out to dry; thus proceed in the same liquor; when it gets reduced, fill it up in the same proportions, keeping it at hand heat all the time, not using any soap.

Dark Colors.—To extract, and insert Light.—This recipe is calculated for carpet rags. In the first place, let the rags be washed clean; the black or brown rags can be colored red, or purple, at the option of the dyer; to do this, take, for every 5 lbs. black or brown rags, muriate of tin, ¾ lb.; and the lac, ½ lb., mixed with the same, as for the lac red; dip the goods in this dye 2 hours, boiling ½ of the time; if not red enough, add more tin and lac. The goods can then be made a purple by adding a little logwood; be careful, and put in but a small handful, as more can be added if not enough. White rags make a beautiful appearance in a carpet, by tying them in the skein, and coloring them red, green, or purple; gray rags will take a very good green; the coloring will be in proportion to the darkness of mix.

Black.—For 5 lbs. goods, sumach, wood and bark together, 3 lbs.; boil ½ hour, and let the goods steep 12 hours; then dip in lime water, ½ hour; then take out the goods, and let them drip an hour; now add to the sumach liquor, copperas, 8 oz., and dip another hour; then run them through the tub of lime-water again for 15 minutes; now make a new dye with logwood, 2½ lbs., by boiling 1 hour, and dip again 3 hours; now add bichromate of potash, 2 oz., to the logwood dye, and dip one hour. Wash in clear cold water, and dry in the shade. You may say this is doing too much. You cannot get a permanent black on cotton with less labor.

Sky Blue.—For 3 lbs. goods, blue vitriol, 4 oz.; boil a few minutes; then dip the goods 3 hours, after which pass them through strong lime-water. You can make this color a beautiful brown by putting the goods through a solution of prussiate of potash.

Lime-Water and Strong Lime-Water.—For Coloring.—Lime-water is made by putting stone lime 1 lb., and strong lime-*water, 1½ lbs., into* a pail of water, slacking, stirring, and letting it stand until it becomes clear, then turn into a tub of water, in which dip the goods.

Blue on Cotton or Linen.—With Logwood.—In all cases, if new, they should be boiled in strong soap-suds or weak lye, and rinsed clean; then for cotton, 5 lbs., or linen, 3 lbs., take bichromate of potash, ¾ lb.; put in the goods, and dip 2 hours; then take out, rinse; make a dye with logwood, 4 lbs.; dip in this 1 hour, air, and let stand in the dye 3 or 4 hours, or till the dye is almost cold; wash out, and dry.

Blue on Cotton.—Without Logwood.—For 5 lbs. of rags, copperas, 4 oz.; boil and dip 15 minutes; then dip in strong suds, and back to the dye 2 or 3 times; then make a dye with prussiate of potash, 1 oz.; oil of vitriol, 5 tablespoons; boil 30 minutes, and rinse; then dry.

Green.—If the cotton is new, boil in weak lye or strong suds; then wash, and dry; give the cotton a dip in the home-made blue dye-tub until blue enough is obtained to make the green as dark as required, take out, dry, and rinse the goods a little; then make a dye with fustic, ¾ lb.; logwood, 3 oz., to each 1 lb. of goods, by boiling the dye 1 hour; when cooled so as to bear the hand, put in the cotton, move briskly a few minutes, and let lie in 1 hour; take out, and let it thoroughly drain; dissolve, and add to the dye, for each lb. of cotton, blue vitriol, ½ oz., and dip another hour; wring out, and let dry in the shade. By adding or diminishing the logwood and fustic, any shade of green may be obtained.

Yellow.—For 5 lbs. of goods, sugar of lead, 7 oz.; dip the goods 2 hours; make a new dye with bichromate of potash, 4 oz.; dip until the color suits, wring out, and dry; if not yellow enough, repeat the operation.

Orange.—For 5 lbs. of goods, sugar of lead, 4 oz.; boil a few minutes, and when a little cool put in the goods, dip 2 hours, wring out; make a new dye with bichromate of potash, 8 oz.; madder, 2 oz.; dip until it suits; if the color should be too red, take off a small sample, and dip it into lime-water, when the choice can be taken of the sample dipped in the lime or the original color.

Red.—Take muriate of tin, ½ of a tea-cup; add sufficient water to cover the goods well, bring it to a boiling heat, putting in the goods 1 hour, stirring often; take out the goods, and empty the kettle, and put in clean water, with nic-wood, 1 lb., steeping it for ½ hour, at hand heat; then put in the goods, and increase the heat for 1 hour, not bringing to a boil at all, stir the goods, and dip an hour as before; wash without soap.

Muriate of Tin.—Tin Liquor.—If druggists keep it, it is best to purchase of them already made; but if you prefer, proceed as follows: Get at a tinner's shop, block tin; put it in a shovel, and melt it. After it is melted, pour it from the height of 4 or 5 feet into a pail of clear water. The object of this is to have the tin in small particles, so that the acid can dissolve it. Take it out of the water and dry it; then put it into a strong glass bottle; pour over it muriatic acid, 12 oz.; then slowly add sulphuric acid, 8 oz. The acid should be added about a tablespoon at a time, at intervals of 5 or 8 minutes; for if you add it too rapidly you run the risk of *breaking the bottle* by heat. After you have all the acid in, let the bottle stand until the ebullition subsides; then stop it up with a bees'-wax or glass stopper, and set it away; and it will keep good for a year or more, or will be fit for use in 24 hours.

GREEN.—VERY HANDSOME WITH OAK BARK.—For 1 lb. of silk, yellow oak bark, 8 oz.; boil it ½ hour; turn off the liquor from the bark, and add alum, 6 oz, let stand until cold; while this dye is being made, color the goods in the blue dye-tub, a light blue; dry, and wash; then dip in the alum and bark dye; if it does not take well, warm the dye a little.

GREEN OR YELLOW—ON SILK OR WOOL, IN FIVE TO FIFTEEN MINUTES.—For 5 lbs. of goods, black oak bark or peach leaves, ½ peck; boil well; then take out the bark or leaves, and add muriate of tin, ½ teacup, stirring well; then put in the goods and stir them round, and it will dye a deep yellow in from 5 to 15 minutes, according to the strength of the bark; take out the goods, rinse, and dry immediately.

N.B.—For a green, add to the above dye extract of indigo, or chemic, 1 tablespoon only at a time, and work the goods 5 minutes, and air; if not sufficiently dark, use the same amount of chemic as before, and work again until it suits.

MULBERRY.—For 1 lb. of silk, alum, 4 oz.; dip 1 hour; wash out, and make a dye with Brazil wood, 1 oz; and logwood, ¼ oz.; by boiling together; dip in this ½ hour, then add more Brazil wood and logwood, in equal proportions, until the color is dark enough.

BLACK.—Make a weak dye as you would for black on woollens, work the goods in bichromate of potash, at a little below boiling heat, then dip in the logwood in the same way; if colored in the blue vitriol dye, use about the same heat.

SPOTS—TO REMOVE AND PREVENT WHEN COLORING BLACK ON SILK OR WOOLLEN.—N.B. In dyeing silk or woollen goods, if they should become rusty or spotted, all that is necessary is to make a weak lye, and have it scalding hot, and put your goods in for 15 minutes; or throw some ashes into your dye, and run your goods in it 5 minutes, and they will come out a jet black, and an even color.

LIGHT CHEMIC BLUE.—For cold water, 1 gal.; dissolve alum, ½ tablespoon, in hot water, 1 teacup, and add to it; then add chemic, 1 teaspoon at a time, to obtain the desired color; the more chemic that is used, the darker will be the color.

PURPLE.—For 1 lb. of silk: having first obtained a light blue by dipping in the home-made blue dye-tub, and dried, dip in alum, 4 oz.; to sufficient water to cover, when a little warm; if the color is not full enough, add a little chemic.

YELLOW.—For 1 lb. of silk, alum, 3 oz.; sugar of lead, ¾ oz.; immerse the goods in the solution over night; take out, drain, and make a new dye with fustic, 1 lb.: dip until the required color is obtained.

N.B.—The yellow or green, for wool, works equally well on silk.

ORANGE.—Take annotto and soda, and add in equal quantities, according to the amount of goods and darkness of the color wanted, say 1 oz. of each, to each pound of silk, and repeat as desired.

Crimson.—For 1 lb. of silk, alum, 3 oz.; dip at hand-heat, 1 hour; take out and drain, while making a new dye, by boiling, 10 minutes, cochineal, 3 oz.; bruised nut-galls, 2 oz; and cream of tartar, ¼ oz., in one pail of water; when a little cool, begin to dip, raising the heat to a boil, continuing to dip 1 hour; wash, and dry.

Cinnamon or Brown on Cotton and Silk—By a New Process—Very Beautiful.—Give the goods as much color, from a solution of blue vitrol, 2 oz., to water, one gal., as it will take up in dipping 15 minutes; then run it through lime-water; this will make a beautiful sky-blue, of much durability; it has now to be run through a solution of prussiate of potash, 1 oz., to water, 1 gal.

Aniline Black on Silk or Cotton.—Water, 20 to 30 parts; chlorate of potassa, 1 part; sal ammoniac, 1 part; chloride of copper, 1 part; aniline, 1 part; and hydrochloric, 1 part; previously mixed together. The fabric or yarn is dried in ageing rooms at a low temperature for 24 hours and washed afterwards.

To Color Straw Hats or Bonnets a Beautiful Slate.—First, soak the bonnet in rather strong warm suds for 15 minutes to remove sizing or stiffening; then rinse in warm water, to get out the soap; now scald cudbear, 1 oz., in sufficient water to cover the hat or bonnet; work the bonnet in this dye, at 180° of heat, until you get a light purple; now have a bucket of cold water, blued with the extract of indigo, ½ oz., and work or stir the bonnet in this, until the tint pleases; dry, then rinse out with cold water, and dry again in the shade. If you get the purple too deep in shade the final slate will be too dark.

To Bleach Straw Bonnets.—Take a common plate, fill it with water, set a small piece of sheet iron, with the ends bent down to raise the top above the water, place in the middle of the tin plate, on which you must place a small piece of brimstone, set it on fire, and cover it over tight with a large bell or large tumbler or bowl that will just shut down close within the rim of the plate; at first raise the cover a little to admit a current of air to cause the sulphur to burn, until you fill the whole with a white vapor; then shut down tight about ten minutes, and the water will absorb the sulphurous acid gas, with which straw hats or wooden articles are washed over to bleach in the most approved manner. It will also remove fruit and vegetable stains from dress.

Washing Fluid—Take 1 lb. sal soda, ½ lb. good stone lime, and 5 qts. of water; boil a short time, let it settle, and pour off the clear fluid into a stone jug, and cork for use; soak your white clothes over night in simple water, wring out and soap wristbands, collars, and dirty or stained places; have your boiler half filled with water just beginning to boil, then put in one common teacupful of fluid, stir and put in your clothes, and boil for half an hour, then rub lightly through *one suds only*, and all is complete.

Chip or Straw Hats or Bonnets may be dyed black by boiling them three or four hours in a strong liquor of logwood, adding a little copperas occasionally. Let the bonnets remain in the liquor all night; then take out to dry in the air. If the black is not satisfactory, dye again after *drying*. Rub inside and out with a sponge *moistened in fine oil;* then block. *Red Dye.*—Boil ground Brazil-wood in a lye of potash, and boil your straw hats, &c., in it. *Blue Dye.*—Take a sufficient quantity of potash lye, 1 lb. of litmus or lacmus, ground: make a decoction and then put in the straw, and boil it.

DYES FOR HATS.—The ordinary bath for dyeing hats, employed by the London manufacturers, consists, for twelve dozen, of 144 lbs. logwood; 12 lbs. of green sulphate of iron or copperas; 7½ lbs. verdigris. The logwood having been introduced into the copper, and digested for some time, the copperas and verdigris are added in successive quantities, and in the above proportions, along with every successive two or three dozens of hats suspended upon the dripping machine. Each set of hats, after being exposed to the bath with occasional airings during forty minutes, is taken off the pegs, and laid out upon the ground to be more completely blackened by the peroxydizement of the iron with the atmospheric oxygen. In three or four hours, the dyeing is completed. When fully dyed, the hats are well washed in running water.

WATERPROOF STIFFENING FOR HATS.—Mix 18 lbs. of shellac with 1½ lb. of salt of tartar (carbonate of potash), and 5½ gals. water. These materials are to be put in a kettle, and made to boil gradually till the lac is dissolved, when the liquid will become as clear as water, without any scum upon the top, and if left to cool, will have a thin crust upon the surface, of a whitish cast, mixed with the light impurities of the gum. When this skin is taken off, the hat body is to be dipped into the mixture in a cold state, so as to absorb as much as possible of it; or it may be applied with a brush or sponge. The hat body, being thus stiffened, may stand till it becomes dry, or nearly so; and after it has been brushed, it must be immersed in very dilute sulphuric or acetic acid, in order to neutralize the potash, and cause the shellac to set. If the hats are not to be napped immediately, they may be thrown into a cistern of pure water, and taken out as wanted.

METHOD OF BLEACHING STRAW.—Dip the straw in a solution of oxygenated muriatic acid, saturated with potash. (Oxygenated muriate of lime is much cheaper.) The straw is thus rendered very white, and its flexibility is increased.

BLEACHING STRAW GOODS.—Straw is bleached by simply exposing it in a closed chamber to the fumes of burning sulphur, an old flour barrel is the apparatus most used for the purpose by milliners, a flat stone being laid on the ground, the sulphur ignited thereon, and the barrel containing the goods to be bleached turned over it. The goods should be previously washed in pure water.

VARNISH FOR FADED RUBBER GOODS.—Black Japan varnish diluted with a little linseed oil.

TO BLEACH LINEN.—Mix common bleaching-powder, in the proportion of 1 lb. to a gallon of water; stir it occasionally for three days, let it settle, and pour it off clear. Then make a lye of 1 lb. of soda to 1 gallon of boiling soft water, in which soak the linen for 12 hours, and boil it half an hour; next soak it in the bleaching liquor, made as above; and lastly, wash it in the usual manner.

Discolored linen or muslin may be restored by putting a portion *of bleaching liquor* into the tub wherein the articles are soaking.

Black Varnish for Chip and Straw Hats.—Best alcohol, 4 oz.; pulverized black sealing-wax, 1 oz.; put them into a phial, and put the phial into a warm place, stirring or shaking occasionally until the wax is dissolved. Apply it when warm before the fire or in the sun. This makes a beautiful gloss.

Easy Method of preventing Moths in Furs or Woollens.—Sprinkle the furs or woollen stuffs, as well as the drawers or boxes in which they are kept, with spirits of turpentine, the unpleasant scent of which will speedily evaporate on exposure of the stuffs to the air. Some persons place sheets of paper, moistened with spirits of turpentine, over, under, or between pieces of cloth, &c., and find it a very effectual method. Many woollen drapers put bits of camphor, the size of a nutmeg, in papers, on different parts of the shelves in their shops, and as they brush their cloths every two, three or four months, this keeps them free from moths: and this should be done in boxes where furs, &c., are put. A tallow candle is frequently put within each muff when laid by.

Clothing Renovator.—Soft water, 1 gal.; make a strong decoction of logwood by boiling the extract with the water. Strain, when cool, add 2 oz. gum arabic in powder; bottle, cork well, and set aside for use; clean the coat well from grease and dirt, and apply the above liquid with a sponge evenly. Dilute to suit the color, and hang in the shade to dry; afterwards brush the nap smooth, and it will look like new.

Waterproofing for Porous Cloth.—Dissolve 2½ lbs. alum in 4 gals. water; dissolve also in a separate vessel the same weight of acetate of lead in the same quantity of water. When both are well dissolved, mix the solutions together; and, when the sulphate of lead resulting from this mixture has been precipitated to the bottom of the vessel in the form of a powder, pour off the solution, and plunge into it the fabric to be rendered waterproof. Wash and rub it well during a few minutes, and hang it in the air to dry.

To Remove Grease.—Aqua ammonia, 2 oz.; soft water, 1 quart; saltpetre, 1 teaspoonful; shaving soap in shavings, 1 oz.; mix altogether; dissolve the soap well, and any grease or dirt that cannot be removed with this preparation, nothing else need be tried for it.

Waterproofing for Clothing.—Boiled oil, 15 lbs.; bee's-wax, 1 lb.; ground litharge, 13 lbs.; mix, and apply with a brush to the article, previously stretched against a wall or a table, previously well washing and drying each article before applying the composition.

To Renew Old Silks.—Unravel and put them in a tub, cover them with cold water, let them remain one hour; dip them up and down, but do not wring; hang up to drain, and iron while very damp, and they will look beautiful.

Dyes for Furs.—*For black*, use the hair dye described in these receipts. *Brown*, use tincture of logwood. *Red*, ground Brazil-wood ¼ lb.; water, 1½ quarts; cochineal, ½ oz.; boil the Brazil-wood in the water one hour; strain and add the cochineal; boil fifteen minutes. *Scarlet color*, boil ½ oz. saffron in ½ pint of water, and pass over the work before applying the red. *Blue*, logwood, 7 oz.; blue vitriol, 1 oz.; water, 22 oz.; boil. *Purple*, logwood, 11 oz.; alum, 3 oz.; water, 29 oz. *Green*, strong vinegar, 1½ pints; best verdigris, 2 oz.; ground fine; sap green, ¼ oz.; mix all together and boil.

Potter's Invisible Waterproofing for Clothing.— Imbue the cloth on the wrong side with a solution of isinglass, alum, and soap dissolved in water, forming an emulsion of a milky thickness; apply with a brush, rubbing in well. When dry, it is brushed on the wrong side against the grain, and then gone over with a brush dipped in water; afterwards brushed down smooth.

To raise a Nap on Cloth.— Clean the article well; soak it in cold water for half an hour; put it on a board, and rub the threadbare parts with a half-worn hatter's card filled with flocks, or with a teazle or a prickly thistle until a nap is raised; then lay the nap the right way with a hatter's brush, and hang up to dry.

Black Reviver for Cloth.—Bruised galls, 1 lb.; logwood, 2 lbs.; green vitriol, ½ lb.; water, 5 quarts; boil two hours; strain, and it is ready for use.

DRUGGISTS' DEPARTMENT.

Remedy for Diphtheria.—The treatment consists in thoroughly swabbing the back of the mouth and throat with a wash made thus: Table salt, 2 drams; black pepper, golden seal, nitrate of potash, alum, 1 dram each; mix and pulverize; put into a teacup half full of water; stir well, and then fill up with good vinegar. Use every half hour, one, two, and four hours, as recovery progresses. The patient may swallow a little each time. Apply 1 oz. each of spirits turpentine, sweet oil, and aqua-ammonia, mixed, every hour to the whole of the throat, and to the breast bone every four hours, keeping flannel to the part.

Holloway's Ointment and Pills.—Butter, 22 oz.; beeswax, 3 oz.; yellow rosin, 3 oz.; melt; and vinegar of cantharides, 1 oz. evaporate; and add Canada balsam, 1 oz.; oil of mace, ½ dram; balsam of Peru, 15 drops. *Pills:* Aloes, 4 parts; myrrh, jalap, and ginger, of each 2 parts; mucilage to mix.

Abernethy's Pills.—Each pill contains 2 grains of blue pill and 3 grains compound extract of colocynth.

Worm Lozenges.—Powdered lump sugar, 10 oz.; starch, 5 oz.; mix with mucilage; and to every ounce add 12 grains calomel; divide in 20 grain lozenges. Dose, two to six.

Soothing Syrup.—Alcohol, oil of peppermint, castor oil, of each, 1 oz.; mix; add oil of anise, ½ dram; magnesia, 60 grains; pulverized ginger, 40 grains; water, 2 oz.; white sugar to form a syrup.

Soothing Syrup.—Take 1 lb. of honey; add 2 tablespoonfuls of paregoric, and the same of oil of anise seed; add enough water to make a thick syrup, and bottle. For children teething, dose, teaspoonful occasionally.

Infant's Syrup.—The syrup is made thus; 1 lb. best box raisins; ½ ounce of anise seed; two sticks licorice; split the raisins, pound the anise seed, and cut the licorice fine; add to it 3 quarts of rain *water, and boil* down to 2 quarts. Feed three or four times a day, *as much as the child* will willingly drink. The raisins are to strengthen, the anise is to expel the wind, and the licorice as a physic.

BRANDETH'S PILLS.—Take 2 lbs. of aloes, 1 lb. of gamboge, 4 oz. of extract of colocynth, ½ lb. of Castile soap, 3 fluid drams of oil of peppermint, and 1 fluid dram of cinnamon. Mix, and form into pills.

PERRY DAVIS' PAIN KILLER.—Myrrh, 1½ oz.; guaiacum resin, 1 oz.; camphor, ½ oz.; red pepper, oil anise, each, 1 dram; dilute alcohol, 2 pints; mix. Stand seven days, and filter.

FAHNESTOCK'S VERMIFUGE.—Castor oil, oil of worm seed, each 1 oz.; oil anise, ½ oz.: tincture myrrh, ½ dram; oil turpentine, 10 minims; castor oil, 2 drops; mix.

SWAIM'S VERMIFUGE.—Wormseed, 2 oz.; valerian, rhubarb, pink-root, white agaric, of each 1½ oz.; boil in sufficient water to yield 3 quarts of decoction; and add to it 10 drops of oil of tansy and 45 drops of oil of cloves, dissolved in a quart of rectified spirits. Dose, 1 tablespoonful at night.

AYER'S CHERRY PECTORAL.—Take 4 grains of acetate of morphia; 2 fluid drams of tincture of bloodroot; 3 fluid drams each of antimonial wine and wine of ipecacuanha, and 3 fluid oz. of syrup of wild cherry. Mix.

BROWN'S BRONCHIAL TROCHES.—Take 1 lb. of pulverized extract of licorice; 1½ lb. of pulverized sugar; 4 oz. of pulverized cubebs; 4 oz. of pulverized gum arabic, 1 oz. of pulverized extract of conium. Mix.

RUSSIA SALVE.—Take equal parts of yellow wax and sweet oil; melt slowly, carefully stirring; when cooling, stir in a small quantity of glycerine. Good for all kinds of wounds, &c.

DENTIST'S COMPOSITION FOR FILLING DECAYED TEETH.—Gold, 1 part; mercury, 8 parts; incorporated by heating together; when mixed pour them into cold water. Or, tinfoil and quicksilver; melt together in a convenient vessel, take a small quantity, knead it in the palm of the hand, and apply quick. Or, mix a little finely-powdered glass with some mineral succedaneum; apply as usual. Or, take some mineral succedaneum, and add some steel dust. Or, mineral succedaneum mixed with levigated porcelain or china. Or, gypsum, 1 part; levigated porcelain, 1 part; levigated iron filings, 1 part; make into a paste with equal parts of quick drying copal and mastic varnish. Or, quicksilver, 40 grains; steel filings, 26 grains. Or, silver, 72 parts; tin, 20 parts; zinc, 6 parts. Better than any, pure gold, 1 part; silver, 3 parts; tin, 2 parts; melt the first two, add the tin, reduce all to a fine powder, use with an equal quantity of pure mercury.

Gutta-percha, softened by heat, is recommended. Dr. Rollfs advises melting a piece of caoutchouc at the end of a wire, and introducing it while warm.

Amalgams for the teeth are made with gold or silver, and quicksilver, the excess of the latter being squeezed out, and the stiff amalgam used warm. Inferior kinds are made with quicksilver and tin, or zinc. A popular nostrum of this kind consists of 40 grains of quicksilver and 20 of fine zinc filings, mixed at the time of using. The following is said to be the most lasting and least *objectionable amalgam:* Melt 2 parts of tin with 1 of cadmium, run it into an ingot, and reduce it to filings. Form these into a fluid amalgam with mercury, and squeeze out the excess of mercury through leather. Work up the solid residue in the hand, and press it into the tooth. Another cement consists of about 73 parts of silver, 21 of tin, and 6 of zinc, amalgamated with quicksilver.

POUDRE METALLIQUE.—The article sold under this name in Paris appears to be an amalgam of silver, mercury, and ammonium, with an excess of mercury, which is pressed out before using it.

TO EXTRACT TEETH WITH LITTLE OR NO PAIN.—Tincture of aconite, chloroform, and alcohol, of each 1 oz.; mix; moisten two pledgets of cotton with the liquid, and apply to the gums on each side of the tooth to be extracted, holding them in their place with pliers or other instruments for from five to ten minutes, rubbing the gum freely inside and out.

TOOTH WASH.—TO REMOVE BLACKNESS.—Pure muriatic acid, 1 oz.; water, 1 oz.; honey, 2 oz.; mix. Take a tooth-brush, and wet it freely with this preparation, and briskly rub the black teeth, and in a moment's time they will be perfectly white; then immediately wash out the mouth with water, that the acid may not act upon the *enamel* of the teeth.

DENTIST'S NERVE PASTE.—Arsenic, 1 part; rose pink, 2 parts. To destroy the nerve, apply this preparation on a pledget of cotton, previously moistened with creosote, to the cavity of the tooth, let it remain 4 hours, then wash out thoroughly with water.

DENTIST'S EMERY WHEELS.—Emery, 4 lbs.; shellac, ½ lb.; melt the shellac over a slow fire; stir in the emery, and pour into a mould of plaster of Paris. When cold it is ready for use.

BASE FOR ARTIFICIAL TEETH.—PROPORTIONS.—India rubber, 1 lb.; sulphur, ½ lb.; vermillion, 1 lb. 4 oz.

CURE FOR LOCK JAW, SAID TO BE POSITIVE.—Let any one who has an attack of lock jaw take a small quantity of spirits of turpentine, warm it, and pour it on the wound—no matter where the wound is, or what its nature is, and relief will follow in less than one minute. Turpentine is also a sovereign remedy for croup. Saturate a piece of flannel with it, and place the flannel on the throat and chest—and in very severe cases three to five drops on a lump of sugar may be taken internally.

COMPOUND EXTRACT OF BUCHU.—Buchu leaves, 1 lb.; boiling distilled water, 3 gals.; boil the leaves in 2 gals. of the water down to 6 qts.; then boil it again in the remaining water till reduced to 2 qts. Evaporate the mixed liquors down to 6 qts., and add 1 qt. strong sage tea, 2 drs. bicarb. potassa, 2 drs. tinct. cannabis indica, 5 oz. rectified spirit, 2 oz. balsam copaiba, and Harlem oil, 1 bottle.

NEW METHOD OF EMBALMING.—Mix together 5 pounds dry sulphate of alumine, 1 quart of warm water, and 100 grains of arsenious acid. Inject 3 or 4 quarts of this mixture into all the vessels of the human body. This applies as well to all animals, birds, fishes, &c. This process supersedes the old and revolting mode, and has been introduced into the great anatomical schools of Paris.

NITRATE OF SILVER.—Pure silver, 1½ oz.; nitric acid, 1 oz. diluted *with water, 2 oz.;* heat by a sand-bath until ebullition ceases, and the water is expelled; then pour into moulds. This substance must be kept from the light.

HAIR DYE, No. 1.—Take gallic acid, ½ oz; alcohol, 8 oz.; soft water, 16 oz. Put the acid in the alcohol, then add the water.

No. 2.—Crystallized nitrate of silver, 1 oz.; strongest ammonia, 3 oz.; gum arabic, ½ oz.; soft water, 6 oz. Put the silver in the ammonia; do not cork it till it is dissolved; dissolve the gum in the water, then mix, and it is ready for use.

Keep Nos. 1 and 2 in separate bottles, and apply each alternately to the hair. Be particular to cleanse the hair before applying the dye.

ANOTHER.—Nitrate of silver, 11 drams; nitric acid, 1 dram; distilled water, 1 pint; sap green, 3 drams; gum arabic, 1 dram. Mix.

ANOTHER.—Nitric acid, 1 dram; nitrate of silver, 10 drams; sap green, 9 drams; mucilage, 5 drams; distilled water, 37½ fluid oz.

HAIR INVIGORATOR.—Bay rum, 2 pints; alcohol, 1 pint; castor oil, 1 oz.; carb. ammonia, ½ oz.; tincture of cantharides, 1 oz. Mix them well. This compound will promote the growth of the hair, and prevent it from falling out.

RAZOR-STROP PASTE.—Wet the strop with a little sweet oil, and apply a little flour of emery evenly over the surface.

OIL OF ROSES.—Olive oil, 1 lb.; otto of roses, 50 drops; oil of rosemary, 25 drops; mix. Another, roses (hardly opened) 12 oz.; olive oil, 10 oz., beat them together in a mortar; let them remain for a few days, then express the oil.

BALM OF BEAUTY.—Pure soft water, 1 qt.; pulverized Castile soap, 4 oz.; emulsion of bitter almonds, 6 oz.; rose and orange flower water, of each, 8 oz.; tincture of benzoin, 2 drs.; borax, 1 dr.; add 5 grs. bichloride of mercury to every 8 oz. of the mixture. To use, apply on a cotton or linen cloth to the face, &c.

ORIENTAL COLD CREAM.—Oil of almonds, 4 oz., white wax and spermaceti, of each, 2 drs.; melt, and add rose water, 4 oz.; orange flower water, 1 oz.; used to soften the skin, apply as the last.

SHAVING CREAM.—White wax, spermaceti, and almond oil, of each ¼ oz.: melt, and while warm, beat in 2 squares of Windsor soap previously reduced to a paste with rose water.

CIRCASSIAN CREAM.—Take 2 ounces of perfectly fresh suet, either mutton or venison; 3 ounces of olive oil; 1 oz. gum benzoin in powder, and ¼ oz. of alkanet root. Put the whole into a jam jar, which, if without a lid, must be tied over with bladder, and place the jar in a saucepan containing boiling water, at the side of the fire. Digest for a whole day, then strain away all that is fluid through fine muslin, and stir till nearly cold. Add, say 1 dram of essence of almonds, roses, bergamot or any other perfume desired.

FRECKLE CURE.—Take two oz. lemon juice, or half a dram of powdered borax, and one dram of sugar; mix together, and let them stand in a glass bottle for a few days, then rub on the face occasionally.

YANKEE SHAVING SOAP.—Take 3 lbs. white bar soap, 1 lb. Castile soap, 1 *quart rain water*; ½ pt. beef's gall, 1 gill spirits of turpentine. Cut the soap into thin slices, and boil five minutes after the soap is dissolved, stir while boiling: scent with oil of rose or almonds. If wished to color it, use ½ oz vermilion.

BLOOM OF YOUTH.—Boil 1 ounce of Brazil wood in 3 pints of water for 15 minutes; strain. Add ¾ oz. isinglass, ¼ oz. cochineal, 1 oz. alum, ½ oz. borax. Dissolve by heat, and strain

COLOGNE WATER.—Oils of rosemary and lemon, of each ¼ oz.; oils of bergamot and lavender, each ⅛ oz.; oil cinnamon, 8 drops; oils of cloves and rose, each 15 drops; best deodorized alcohol, 2 qts.; shake 2 or 3 times per day for a week.

We propose to give the formula for the following preparations, and shall commence with what is said to be

BOGLE'S HYPERION FLUID.—To 8 oz. of 90 or 95 per cent. alcohol, colored red with alkanet, add 1 oz. of castor-oil: perfume with geranium and verbena.

LYON'S KATHAIRON.—To 8 oz. of 80 per cent. alcohol, colored yellow by a few drops extract of annotto, add 2 oz. castor-oil, and perfume with a little bergamot.

PHALON'S HAIR RESTORATIVE.—To 8 oz. of 90 per cent. alcohol, colored by a few drops tincture of alkanet root, add 1 oz. of castor oil, and perfume with a compound of bergamot, neroli, verbena, and orange.

MRS. ALLEN'S.—To 16 oz. of rose water, diluted with an equal part of salt water, add ½ oz. of sulphur and ¼ oz. of sugar of lead; let the compound stand five days before using.

BATCHELOR'S HAIR-DYE.—No. 1. To 1 oz. of gallic acid, dissolved in 8 oz. alcohol, add ½ gal. soft water. No. 2. To 1 oz. nitrate of silver, dissolved in 1 oz. of concentrated ammonia, and 3 oz. of soft water, add 1 oz. gum arabic and 4 oz. of soft water.

CHRISTADORO'S HAIR-DYE.—No. 1. To ¼ oz. of gallic acid, dissolved in 8 oz. alcohol, add ½ gal. soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 1 oz. concentrated aqua-ammonia and 2 oz. soft water, add 2 oz. gum arabic and 5 oz. soft water.

PHALON'S INSTANTANEOUS HAIR-DYE.—No. 1. To 1½ oz. gallic acid, and ¼ oz. of tannia, dissolved in 8 oz. of alcohol, add ½ gal. of soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 1 oz. concentrated aqua-ammonia, add 1½ oz. gum arabic, and 8 oz. soft water.

HARRISON'S.—No. 1. To ½ oz. gallic acid, 1 oz. of tannia dissolved in 10 oz. alcohol, add 2 qts. soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 2 oz. of concentrated aqua-ammonia, add 12 oz. soft water and 1½ oz. gum arabic. No. 3. 1 oz. hydro-sulphate of potassa, dissolved in ½ gal. of soft water. This last ingredient is intended to produce a deep black color if the others should fail.

PHALON'S (ONE PREPARATION.)—To 1 oz. crystallized nitrate of silver, dissolved in 2 oz. of aqua-ammonia, add 16 oz. soft water. This is not an instantaneous dye; but, after exposure to the light and air, a dark color is produced upon the surface to which it is applied.

PROFESSOR WOOD'S.—To 8 oz. vinegar, diluted with an equal *part of soft water*, add 2 drs. sulphur, and 2 drs. sugar of lead.

Twigg's Hair-Coloring.—Take 1 dr. lac sulphur, ½ dr. sugar of lead, 4 oz. rose water; mix carefully. Apply to the hair repeatedly, till it assumes the desired shade.

Alpine Hair-Balm.—To 16 oz. of soft water add 8 oz. of alcohol and ½ oz. spirits turpentine, ¼ oz. sulphur, and ¼ oz. sugar of lead.

Glycerine Preparation.—New rum, 1 qt.; concentrated spirits of ammonia, 15 drops; glycerine oil, 1 oz.; lac sulphur, 5½ drs.; sugar of lead, 5½ drs.; put the liquor into a bottle, add the ammonia, then the other components. Shake the compound occasionally for four or five days.

Crystalline Cream.—Oil of almond, 8 oz.; spermaceti, 1 oz.; melt together. When a little cooled, add ½ oz. or less of essence of bergamot or other perfume; put into wide-mouthed bottles, and let it stand till cold. *Camphorated* crystalline cream may be made by using camphorated oil (L. Champhoræ) instead of oil of almonds.

Macassar Oil.—Olive oil, 1 qt.; alcohol, 2½ oz.; rose oil, 1½ oz.; then tie 1 oz. of chipped alkanet root in a muslin bag, and put it in the oil, let it alone for some days till it turns the color of a pretty red, then remove to other oils. Do not press it.

Ox Marrow.—Melt 4 oz. ox tallow; white wax, 1 oz.; fresh lard, 6 oz.; when cold, add 1½ oz. oil of bergamot.

Bear's Oil.—Use good sweet lard oil, 1 qt., oil bergamot, 1½ oz.

Hair Restorative.—Sugar of lead, borax and lac sulphur, of each, 1 oz.; aqua ammonia, ½ oz; alcohol, 1 gill. These articles are to stand mixed for 14 hours; then add bay rum, 1 gill: fine table salt, 1 tablespoon; soft water, 3 pts.; essence of bergamot, 1 oz. This preparation gives a splendid glossy appearance to the hair, turns gray hair to a dark color, and restores the hair when common baldness sets in. When the hair is thin or bald, apply twice a day with a hard brush, working it into the roots of the hair. For gray hair once a day is sufficient.

Balm of a Thousand Flowers.—Deodorized alcohol, 1 pt.; nice white bar soap, 4 oz.; shave the soap when put in, stand in a warm place till dissolved; then add oil of citronella, 1 dr.; and oils of neroli and rosemary, of each ½ dr.

New York Barber's Star Hair Oil.—Castor oil 6½ pts.; alcohol, 1½ pts.; citronella and lavender oil, each ½ oz.

Barber's Shampoo Mixture.—Soft water, 1 pt.; sal soda, 1 oz.; cream tartar, ¼ oz. Apply thoroughly to the hair.

Frangipanni.—Spirits, 1 gal.; oil bergamot, 1 oz.; oil of lemon, 1 oz.; macerate for 4 days, frequently shaking; then add water, 1 gal.; orange-flower water, 1 pint, essence of vanilla, 2 oz. Mix.

Jockey Club.—Spirit of wine, 5 gal.; orange-flower water, 1 gal.; balsam of Peru, 4 oz.; essence of bergamot, 8 oz.; essence of musk, 8 oz.; essence of cloves, 4 oz.; essence of neroli, 2 oz. Mix.

Ladies' Own.—Spirits of wine, 1 gal.; otto of roses, 20 drops; essence of thyme, ½ oz.; essence of neroli, ¼ oz.; essence of vanilla, ½ oz.; essence of bergamot, ¼ oz.; orange-flower water, 6 oz.

Kiss me Quick.—Spirit, 1 gal.; essence of thyme, ¼ oz.; essence of orange-flowers, *2 oz.; essence* neroli. ½ oz.; otto of roses, 30 drops; *essence of jasmine, 1 oz.;* essence of balm mint ½ oz petals of roses, 4 oz.; oil lemon, 20 drops; calorus aromaticus, ½ oz. essence neroli, ¼ oz. Mix and strain.

Upper Ten.—Spirits of wine, 4 qts.; essence of cedrat, 2 drs.; essence of violets, ¼ oz.; essence of neroli, ½ oz.; otto of roses, 20 drops; orange-flower essence, 1 oz.; oil of rosemary, 30 drops; oils bergamot and neroli, each ½ oz.

India Cholagogue.—Quinine, 20 grs.; peruvian bark, pulverized, 1 oz.; sulphuric acid, 15 drops, or 1 scruple of tartaric acid is best; brandy, 1 gill; water to make one pint; dose, 5 teaspoonfuls every 2 hours in the absence of fever, an excellent remedy.

Febrifuge Wine.—Quinine, 25 grs.; water, 1 pint; sulphuric acid, 15 drops; epsom salts, 2 oz.; color with tincture of red sanders; dose, a wine glass 3 times per day. This is a world renowned medicine.

Barrell's Indian-Liniment.—Alcohol, 1 qt.; tincture of capsicum, 1 oz.; oil of origanum, sassafras, pennyroyal, and hemlock, of each ½ oz. Mix.

Cod Liver Oil, as usually prepared, is nothing more or less than cod oil clarified, by which process it is in fact deprived in a great measure of its virtue. Cod oil can be purchased from any wholesale oil dealer for one thirtieth part of the price of cod liver oil as usually sold, and it is easy to clarify it. Dealers might turn this information to good account. To make it more palatable and digestible, put 1 oz. of fine table salt to each quart bottle.

Simple Remedies for Scarlet Fever.—Open the bowels regularly every day, with some mild aperient medicine, such as castor oil, senna, etc., and keep the patient at rest, and comfortably warm; sponge the surface with tepid water, two or three times a day; while it is hotter than natural, admit fresh air; live on a bland diet, such as a cupful of arrowroot, several times a day; toast-water for common drink. Gargle made of strong sage tea, honey and alum, or borax, may be used from the commencement, if the throat is affected.

Paregoric.—Best opium, ½ dr., dissolve it in about 2 tablespoons of boiling water; then add benzoic acid, ½ dr.; oil of anise, ½ a fluid dr.; clarified honey, 1 oz.; camphor gum, 1 scruple; alcohol, 76 per cent, 11 fluid oz.; distilled water, 4 fluid oz.; macerate (keep warm) for two weeks. Dose—For children, 5 to 20 drops, adults, 1 to 2 teaspoons.

Cough Syrup.—Put 1 qt. hoarhound tea; 1 qt. of water, and boil it down to 1 pt.; add 2 or 3 sticks licorice; 2 oz. syrup of squills, and a tablespoonful essence of lemon. Take a tablespoonful 3 times a day, or as the cough requires.

Cough Syrup.—Syrup of squills, 2 oz.; tartarized antimony, 8 grs.; sulphate of morphine, 5 grs.; pulverized gum arabic, ¼ oz.; honey, 1 oz.; water, 1 oz., mix: dose for an adult 1 small teaspoonful, repeat in half an hour if it does not relieve: child in proportion.

Vegetable Substitute for Calomel.—Jalap, 1 oz., senna, 2 oz., peppermint, 1 oz. (a little cinnamon if desired,) all pulverized and sifted through gauze. Dose, 1 teaspoonful put in a cup with 2 or 3 spoonfuls of hot water, and a good lump of white sugar; *when cool, drink all*; to be taken fasting in the morning; drink freely, if it does not operate in 3 hours repeat ½ the quantity, use instead of calomel.

Stammering.—Impediments in the speech may be cured, where there is no mal-formation of the organs of articulation, by perseverance, for three or four months, in the simple remedy of reading aloud, with the teeth closed, for at least 2 hours in the course of each day.

Cold in the Head.—Dr. Pollion, of France, says that cold in the head can be cured by inhaling hartshorn. The inhalation by the nose should be seven or eight times in five minutes.

Camphor Ice.—Spermaceti, 1½ oz., gum camphor, ¾ oz., oil sweet almonds, 4 teaspoonfuls; set on the stove in an earthen dish till dissolved; heat just enough to dissolve it. While warm pour into small moulds, if desired to sell; then paper, and put into tinfoil; used for chaps on hands or lips.

Imperial Drops for Gravel and Kidney Complaints.—Oil of origanum, 1 oz., oil of hemlock, ¼ oz., oil of sassafras, ¼ oz., oil of anise, ½ oz., alcohol, 1 pint: mix. Dose, from ½ to 1 teaspoonful 3 times a day, in sweetened water, will soon give relief when constant weakness is felt across the small of the back, as well as gravelly affections causing pain about the kidneys.

Positive Cure for Gonorrhœa.—Liquor of potass, ½ oz., bitter apple, ½ oz., spirits of sweet nitre, ½ oz., balsam of copaiba, ½ oz., best gum, ¼ oz. To use, mix with peppermint water; take ½ teaspoonful 3 times per day: cure certain in 9 days.

Celebrated Pile Ointment.—Take carbonate of lead, ½ oz., sulphate of morphia, 15 grs.; stramonium ointment, 1 oz.; olive oil, 20 drops. Mix, and apply 3 times per day, or as the pain may require.

Fly Paper.—Coat paper with turpentine varnish, and oil it to keep the varnish from drying.

Sweating Drops.—Ipecac., saffron, boneset, and camphor gum, of each, 3 oz.; opium, 1 oz., alcohol, 2 qts. Let stand 2 weeks and filter. A teaspoonful in a cup of hot sage or catnip tea every hour until free perspiration is induced; excellent in colds, fevers, inflammations, &c. Bathe the feet in hot water at the same time.

Syrup for Consumptives.—Of tamarac bark, take from the tree without rossing, 1 peck; spikenard root, ½ lb.; dandelion root, ¼ lb.; hops, 2 oz. Boil these sufficient to get the strength in 2 or 3 gals. water; strain, and boil down to 1 gal.; when blood warm, add 3 lbs. best honey, and 3 pints best brandy; bottle and keep in a cool place. Dose, drink freely of it 3 times per day before meals, at least a gill or more; cure very certain.

Common Castor Oil.—Pale vegetable oil, 1 gal., castor oil, 3 gals. Mix.

Pulmonic Wafers.—Lump sugar, licorice, and starch, of each 2 parts; gum, 10 parts; squills and ipecacuanha, of each 5 parts; lactucarium, 2 parts. Mix, and divide into 8-grain lozenges.

Sir James Clarke's Diarrhœa and Cholera Mixture.—Tinct. of opium, tinct. of camphor, and spirits of turpentine, of each 3 drams; oil of peppermint, 30 drops; mix. Dose, 1 teaspoonful in brandy and water for diarrhœa; 1 tablespoonful for cholera.

Vegetable or Composition Powder.—Fine bayberry bark, 1 lb., ginger 8 oz., common cayenne, 3 oz., mix. Dose, 1 teaspoonful in a cup of boiling water, sweeten and add milk. The best powder on record.

Tinctures are made with 1 oz. of gum, root, or bark, &c., dried, to each pint of proof spirits, and let it stand one week, and filter.

Essences are made with 1 oz. of any given oil, added to 1 pint alcohol. Peppermints are coloured with tinct. turmeric, cinnamon with tinct. of red sanders, wintergreen with tinct. kino.

Substitute for Arrowroot.—Finest potato starch, 75 lbs.; lump sugar, 8 lbs.; finely-ground rice, 21 lbs. Mix, and sift through lawn; yields 100 lbs. excellent arrowroot.

Certain Cure for Croup.—Goose oil and urine equal parts. Dose, 1 teaspoonful. A certain cure if taken in time.

Corns and Warts.—Take a small quantity of the potash paste recommended for Poll Evil, and apply to the corn or wart.

Druggist's Colors.—*Yellow*, take iron filings, hydrochloric acid to dissolve, dilute with cold water. *Red*, solution of sal ammoniac, cochineal to color. *Blue*, indigo 1 part, oil of vitriol, 2 parts, dissolve, then dilute with water. *Green*, verdigris, 1 part, acetic acid, 3 parts, dilute with water. *Purple*, cochineal, 25 grs., sugar of lead 1 oz., dissolve.

Smelling Salts.—Sub-carbonate of ammonia, 8 parts; put it in coarse powder in a bottle, and pour on it oil of lavender, 1 part.

Tunbridge Wells Water.—Chloride of sodium, 5 grains; tinct. steel, 20 drops; distilled water, 1½ pints.

Mineral Water.—Epsom salts, 1 oz.; cream tartar, ½ oz.; tartaric acid, ¼ oz.; loaf sugar, 1 lb.; oil of birch, 20 drops; put 1 qt. cold water on 2 tablespoonfuls yeast (winter green oil will do), let it work 2 hours and then bottle.

Genuine Seidlitz Powders.—Rochelle salts, 2 drs.; bicarb. soda, 2 scruples; put these into a blue paper, and put 35 grains tartaric acid into a white paper. To use, put each into different tumblers, fill ½ with water, adding a little loaf sugar to the acid, then pour together and drink quick.

Bottled Seidlitz Water.—Fill soda-water bottles with clear water; add to each as below; cork and wire immediately: Rochelle salts, 3 drops; bicarbonate of soda, 35 grs.; sulphuric acid, 11 drops

Excellent Tooth Powder.—Suds of Castile soap and spirits of camphor, of each an equal quantity; thicken with equal quantities of pulverized chalk and charcoal to a thick paste. Apply with the finger or brush.

Rat Exterminator.—Warm water, 1 qt.; lard, 2 lbs.; phosphorus, 1 oz.; mix, and thicken with flour; to be spread on bread and covered with sugar.

Bug Poison.—Alcohol, ½ pint; turpentine, ½ pint; crude sal ammoniac, 1 oz.; mix all together, and let it digest in a warm place for a few days, and it is ready for use.

Medicated Cough Candy.—To 5 lbs. candy just ready to pour on the slab, add the following mixture, and form it into sticks to *correspond with the* price asked for them: Tinct. squills, 2 oz.; cam-

d tinct. of opium and tinct. of tolu, of each ½ oz.; wine of
½ oz.; oils of gaultheria, 4 drops; sassafras, 3 drops;
anise seed oil, 2 drops, and use this freely in common

ISON'S INFANTS' PRESERVATIVE.—Carbonate of magnesia, 6
gar, 2 oz.; oil of anise seed, 20 drops; sal-volatile, 2½ drs.;
m, 1 dr.; syrup of saffron, 1 oz. Make up 1 pint with carra-
ter.

PILL.—Quinine, 20 grs.; Dover's powders, 10 grs.; sub-car-
f iron, 10 grs.; mix with mucilage of gum arabic and form
pills. Dose, 2 each hour, commencing 5 hours before the
uld set in. Then take 1 night and morning until all are

TO PROMOTE MENSTRUAL SECRETION.—Take pills of aloes
rh, 4 drs.; compound iron pills, 280 grs.; mix and form into
. Dose, 2 twice a day.

BSTRUCTED MENSTRUATION.—Sulphate of iron, 60 grs.; po-
ub carb.) 60 grs.; myrrh, 2 drs.; make them into 3½ gr.
to be taken three times a day, in the absence of fever. For
menstruation, take pulv. rhei., 2 drs.; pulv. jalap, 2 dr;
of poppies to mix. Divide into 200 pills, and take night
ning. To check immoderate flow—Tinct. of ergot, 1 oz.,
ammonia, 3 drs.; mix. Dose, teaspoonful in water 3 times

LANT.—IN LOW FEVERS, AND AFTER UTERINE HEMORRHAGES.
randy and cinnamon water, of each, 4 fluid oz.; the yolks
s, well beaten; loaf sugar, ½ oz.; oil of cinnamon, 2 drops;
ose, From ½ to 1 (fluid) oz., as often as required. This
oth meat and drink. Of course, any other flavoring oils can
if preferred, in place of the cinnamon.

EMALE COMPLAINTS.—One of the best laxative pills for
omplaints is macrotin and rhubarb, each 10 grs.; extract
yamus 10 grs.; Castile soap, 40 grs.; scrape the soap, and
together, forming into common sized pills with gum solu-
ose, 1 pill at bed time, or sufficiently often to keep the
n a laxative state.

NE FOR PAINFUL MENSTRUATION.—Extract of stramonium
hate of quinine, each 16 grs.; macrotin, 8 grs.; morphine,
ake into 8 pills. Dose, 1 pill, repeating once or twice only,
minutes apart, if the pain does not subside before this
ain *must* subside under the use of this pill, and costiveness
creased.

ER FOR EXCESSIVE FLOODING.—Gums kino and catechu, each
ugar of lead and alum, each ½ dr.; pulverize all and
hly mix, then divide into 7 to 10 grain powders. Dose,
y 2 or 3 hours until checked, then less often merely to con-
flow.

ION FOR LEUCORRHÆA.—When the glairy mucus discharge
it, prepare a tea of hemlock inner bark and witch hazel
lled spotted alder) leaves and bark, have a female syringe
ough to fill the vagina, and inject the tea, twice daily
sionally in bad cases, say twice a week, inject a syringe
llowing composition:

For Chronic Female Complaints.—White vitriol and sugar of lead, each, ⅛ oz.; common salt, pulverized alum, and loaf sugar, each, ½ dr.; soft water, 1 pt. Inject as above.

For Prelapsus uteri, or Falling of the Womb.—Not only the cheapest but the best support will be found to be a piece of fine firm sponge, cut to a proper size, to admit when damp of being pressed up the vagina to hold the womb in its place. The sponge should have a stout piece of small cord sewed 2 or 3 times through its centre, up and down, and left sufficiently long to allow its being taken hold of to remove the sponge, once a day, or every other day at the farthest, for the purpose of washing, cleaning, and using the necessary injections; and this must be done while the patient is lying down, to prevent the womb from again falling or prolapsing. After having injected some of the above tea, wet the sponge in the same, and introduce it sufficiently high to hold the womb in its place. If pain is felt about the head, back, or loins for a few days before the menses appear, prepare and use the following:

Emmenagogue Tincture.—Alcohol, 1 pt.; red oxide of iron, 1 oz.; oils of juniper and savin, each ¼ oz.; oil of tansey, 1 dr.; tincture of ergot, 3 drs.; tincture Spanish flies, ½ oz.; mix all, and shake when taken. Dose, 1 teaspoon 3 times daily, to be taken in mucilage of slippery elm or gum arabic, and drink freely of the mucilage also through the day, or use the following:

Emmenagogue Pill.—Precipitated carbonate of iron and gum myrrh, of each 2 drs.; aloes and tincture of Spanish flies, of each 1 dr.; and oil of savin, 1 dr.; all to be pulverized, and made into 100 pills by using thick gum solution. Dose, 1 pill, from 1 to 3 times daily, but not to move the bowels too much.

Uterine Hemorrhages.—Unfailing cure. Sugar of lead, 10 grs.; ergot, 10 grs.; opium, 3 grs.; ipecac., 1 gr.; all pulverized and well mixed. Dose, 10 to 12 grs.; given in a little honey or syrup.

In very bad cases after childbirth, it might be repeated in 30 minutes, or the dose increased to 15 or 18 grs.; but in cases of rather profuse wasting, repeat it once at the end of 3 hours, or as the urgency of the case may require.

In every case of female debility make a liberal use of iron, as the want of iron in the system is often the cause of the trouble. Mix fine iron filings with as much ground ginger. Dose, half of a teaspoon 3 times daily in a little honey or molasses, increasing or lessening the dose to produce a blackness of the stools. Continue this course until well.

Nerve and Bone Liniment.—Beef's gall. 1 qt.; alcohol, 1 pt.; volatile liniment, 1 lb.; spts. of turpentine, 1 lb.; oil origanum, 4 oz.; aqua ammonia, 4 oz.; tincture of cayenne, ½ pt.; oil of amber, 3 oz.; tincture Spanish flies, 6 oz.; mix well.

Cephalic Snuff.—Take asarabacca leaves, marjoram, light Scotch snuff, equal parts; grind them and sift, use like common snuff.

Downer's Salve.—Beeswax, 4 oz.; opium, ¼ oz.; sugar of lead, 1 oz.; melt the beeswax, and rub the lead up in the wax, then the opium, then 1 gill of sweet oil, incorporate all thoroughly together, spread lightly on cloth; good for burns, piles, &c.

ANOTHER SALVE.—Burgundy pitch, beeswax, white pine pitch, and rosin, 1 oz. each, mutton tallow, 8 oz.; goose oil, 1 gill, tar, 1 gill, melt and mix thoroughly. A first-rate salve.

WHOOPING COUGH SYRUP.—Best rum, 1 pt.; anise oil, 2 ozs.; honey, 1 pt.; lemon juice, 4 oz., mix. Dose for adults, 1 tablespoonful, 3 or 4 times per day; children 1 teaspoon, with sugar and water.

LIQUID OPODELDOC.—Warm brandy, 1 qt.; add to it gum camphor, 1 oz.; sal ammoniac, ¼ oz.; oils of origanum and rosemary, each ½ oz.; oil wormwood, ¼ oz.; when the oils are dissolved, add 6 oz. soft soap.

GREEN MOUNTAIN SALVE.—For rheumatism, burns, pains in the back or side, &c., take 2 lbs. rosin burgundy pitch, ¼ lb.; beeswax, ¼ lb.; mutton tallow, ¼ lb.; melt slowly; when not too warm, add oil hemlock, 1 oz.; balsam fir, 1 oz; oil of origanum, 1 oz.; oil of red cedar, 1 oz.; Venice turpentine, 1 oz.; oil of wormwood, 1 oz.; verdigris, ½ oz. The verdigris must be finely pulverized and mixed with the oils; then add as above, and work in cold water like wax till cold enough to roll; rolls 5 inches long, 1 inch diameter, sell for 25 cents.

ENGLISH REMEDY FOR CANCER.—Take chloride of zinc, bloodroot pulverized, and flour, equal quantities of each, worked into a paste and applied. First spread a common sticking-plaster *much* larger than the cancer, cutting a circular piece from the centre of it a little larger than the cancer, applying it, which exposes a narrow rim of healthy skin; then apply the cancer plaster, and keep it on 24 hours. On removing it, the cancer will be found to be burned into, and appears the color of an old shoe-sole, and the rim outside will appear white and parboiled, as if burned by steam. Dress with slippery elm poultice until suppuration takes place, then heal with any common salve.

CHRONIC GOUT—TO CURE.—Take hot vinegar, and put into it all the table salt which it will dissolve, and bathe the parts affected with a soft piece of flannel. Rub in with the hand, and dry the foot, &c., by the fire. Repeat this operation four times in the 24 hours, 15 minutes each time, for four days; then twice a day for the same period; then once, and follow this rule whenever the symptoms show themselves at any future time.

GOUT TINCTURE.—Veratrum viride (swamp hellebore), ½ oz.; opium, ¼ oz.; wine, ½ pt.; let them stand for several days. Dose, 15 to 30 drops, according to the robustness of the patient, at intervals of 2 to 4 hours.

PARALYTIC LINIMENT.—Sulphuric ether, 6 oz.; alcohol, 2 oz.; laudanum, 1 oz.; oil of lavender, 1 oz.; mix, and cork tightly. In a recent case of paralysis let the whole extent of the numb surface be thoroughly bathed and rubbed with this preparation, for several minutes, using the hand, at least three times daily; at the same time take internally, 20 drops of the same, in a little sweetened water, to prevent translation upon some internal organ.

CHARCOAL A CURE FOR SICK HEADACHE.—It is stated that 2 tea spoons of finely powdered charcoal, drank in ½ a tumbler of water will, *in less than fifteen minutes*, give relief to the sick headache, when caused, as in most cases it is, by superabundance of acid on the stomach. We have frequently tried this remedy, and its efficacy in every instance has been signally satisfactory.

CATHARTIC SYRUP.—Best senna leaf, 1 oz.; butternut, the inner bark of the root, dried and bruised, 2 oz.; peppermint leaf, ½ oz.; fennel seed, ½ oz.; alcohol, ½ pt.; water, 1½ pts.; sugar, 2 lbs.; put all into the spirit and water, except the sugar, and let it stand two weeks, then strain, pressing out from the dregs, adding the sugar and simmering a few minutes only, to form the syrup. If it should cause griping in any case, increase the fennel seed and peppermint leaf. Dose, 1 tablespoon, once a day, or less often if the bowels become too loose, up to the next period when the headache might have been expected, and it will not be forthcoming.

CHILBLAINS.—TO CURE.—Mutton tallow and lard, of each ¼ lb.; melt in an iron vessel, and add hydrated oxyde of iron, 2 oz.; stirring continually with an iron spoon, until the mass is of a uniform black color; then let it cool, and add Venice turpentine, 2 oz.; Armenian bole, 1 oz.; oil of bergamot, 1 dr.; rub up the bole with a little olive oil before putting it in.

FELONS.—IF RECENT, TO CURE IN SIX HOURS.—Venice turpentine, 1 oz; and put into it half a teaspoon of water, and stir with a rough stick until the mass looks like candied honey; then spread a good coat on a cloth, and wrap around the finger. If the case is only recent, it will remove the pain in six hours.

FELON SALVE.—A salve made by burning one tablespoon of copperas, then pulverizing it and mixing it with the yolk of an egg, is said to relieve the pain, and cure the felon in 24 hours; then heal with cream two parts, and soft soap one part. Apply the healing salve daily after soaking the part in warm water.

FELON OINTMENT.—Take sweet oil, ½ pt., and stew a 3-cent plug of tobacco in it until the tobacco is crisped; then squeeze it out, and add red lead, 1 oz.; and boil until black; when a little cool, add pulverized camphor gum, 1 oz.

WARTS AND CORNS.—TO CURE IN TEN MINUTES.—Take a small piece of potash, and let it stand in the open air until it slacks, then thicken it to a paste with pulverized gum arabic, which prevents it from spreading where it is not wanted.

GERMAN RHEUMATIC FLUID.—Oils of hemlock and cedar, of each ½ oz., oils of origanum and sassafras, each 1 oz.; aqua ammonia, 1 oz.; capsicum pulverized, 1 oz.; spirits of turpentine and gum camphor, each ½ oz.; put all into a quart bottle, and fill with 95 per cent alcohol.

Dose, for colic, for man, half a teaspoonful; for a horse, ½ to 1 oz., in a little warm water, every 15 minutes, till relieved.

LINIMENT FOR OLD SORES.—Alcohol, 1 qt.; aqua ammonia, 4 oz.; oil of origanum, 2 oz.; camphor gum, 2 oz.; opium, 2 oz.; gum myrrh, 2 oz.; common salt, two tablespoons. Mix, and shake occasionally for a week.

LINIMENT.—GOOD SAMARITAN.—Take 98 per cent. alcohol, 2 qts.; and add to it the following articles: Oils of sassafras, hemlock, spirits of turpentine, tincture of cayenne, catechu, guaiac (guac), and laudanum, of each, 1 oz.; tincture of myrrh, 4 oz.; oil of origanum, 2 oz; oil of wintergreen, ½ oz.; gum camphor. 2 oz.; and chloroform, 1½ oz. This is one of the best applications for internal pains known: it is superior to any other enumerated in this work.

Cook's Electro-Magnetic Liniment.—Best alcohol, 1 gal.; oil of amber, 8 oz.; gum camphor, 8 oz.; Castile soap, shaved fine, 2 oz.; beef's gall, 4 oz.; ammonia, 3 F.'s strong, 12 oz.; mix, and shake occasionally for 12 hours, and it is fit for use. This will be found a strong and valuable liniment.

London Liniment.—Take chloroform, olive oil, and aqua ammonia, of each 1 oz.; acetate of morphia, 10 grs. Mix and use as other liniments. Very valuable.

Ointments.—For Old Sores.—Red precipitate, ½ oz.; sugar of lead, ½ oz.; burnt alum, 1 oz.; white vitriol, ¼ oz., or a little less; all to be very finely pulverized; have mutton tallow made warm, ½ lb.; stir all in, and stir until cool.

Judkin's Ointment.—Linseed oil, 1 pt.; sweet oil, 1 oz.; and boil them in a kettle on coals for nearly 4 hours, as warm as you can; then have pulverized and mixed borax, ½ oz.; red lead, 4 oz.; and sugar of lead, 1½ oz.; remove the kettle from the fire, and thicken in the powder; continue the stirring until cooled to blood heat, then stir in 1 oz. of spirits of turpentine; and now take out a little, letting it get cold, and if not then sufficiently thick to spread upon thin soft linen as a salve, you will boil again until this point is reached. It is good for all kinds of wounds, bruises, sores, burns, white swellings, rheumatisms, ulcers, sore breasts; and even where there are wounds on the inside, it has been used with advantage, by applying a plaster over the part.

Green Ointment.—Honey and bees'-wax, each ½ lb.; spirits of turpentine, 1 oz.; wintergreen oil and laudanum, each 2 oz.; verdigris, finely pulverized, ¼ oz.; lard, 1½ lb.; mix by a stove fire, in a copper kettle, heating slowly.

Mead's Salt-Rheum Ointment.—Aquafortis, 1 oz.; quicksilver, 1 oz.; good hard soap, dissolved so as to mix readily, 1 oz.; prepared chalk, 1 oz.; mixed with 1 lb. of lard; incorporate the above by putting the aquafortis and quicksilver into an earthen vessel, and when done effervescing, mix with the other ingredients, putting the chalk in last; add a little spirits of turpentine, say ½ tablespoon.

Itch Ointment.—Unsalted butter, 1 lb.; burgundy pitch, 2 oz.; spirits of turpentine, 2 oz.; red precipitate, pulverized, 1¼ oz.; melt the pitch and add the butter, stirring well together; then remove from the fire, and when a little cool add the spirits of turpentine, and lastly the precipitate, and stir until cold.

Magnetic Ointment.—Said to be Trask's.—Hard raisins cut in pieces, and fine-cut tobacco, equal weights; simmer well together, then strain, and press out all from the dregs.

Jaundice.—In its Worst Forms.—Red iodide of mercury, 7 grs. iodide of potassium, 9 grs.; aqua dis. (distilled water) 1 oz.; mix. Commence by giving 6 drops 3 or 4 times a day, increasing 1 drop a day until 12 or 15 drops are given at a dose. Give in a little water, immediately after meals. If it causes a griping sensation in the bowels, and fulness in the head, when you get up to 12 or 15 drops, go back to 6 drops, and up again as before.

Inflammatory Rheumatism.—Sulphur and saltpetre, of each 1 oz.; gum guaiac, ½ oz.; colchicum root, or seed, and nutmegs, of each ¼ oz.; all to be pulverized and mixed with simple syrup, or molasses, 2 oz. Dose, one teaspoon every 2 hours until it moves the bowels rather freely; then 3 or 4 times daily until cured.

Remedy for Rheumatism and Stiff Joints.—Strong camphor spirits, 1 pt.; neat's-foot, coon, bear, or skunk's oil, 1 pt.; spirits of turpentine, ½ pt. Shake the bottle when used, and apply 3 times daily, by pouring on a little at a time, and rubbing in all you can for 20 or 30 minutes.

Asthma Remedies.—Elecampane, angelica, comfrey, and spikenard roots with hoarhound tops, of each 1 oz.; bruise and steep in honey, 1 pt. Dose, a tablespoon, taken hot every few minutes, until relief is obtained, then several times daily until a cure is effected.

Another.—Oil of tar, 1 dr.; tincture of veratrum viride, 2 drs.; simple syrup, 2 drs.; mix. Dose, for adults, 15 drops 3 or 4 times daily. Iodide of potassium has cured a bad case of asthma by taking 5 gr. doses 3 times daily. Take ⅓ oz. and put it into a phial, and add 32 teaspoons of water; then 1 teaspoon of it will contain the 5 grs., which put into ½ gill more water, and drink before meals.

Composition Powder—Thompson's.—Bayberry bark, 2 lbs.; hemlock bark, 1 lb.; ginger root, 1 lb.; cayenne pepper, 2 oz.; cloves, 2 oz.; all finely pulverized and well mixed. Dose, ½ a teaspoon of it, and a spoon of sugar; put them into a tea-cup, and pour it half full of boiling water; let it stand a few minutes, and fill the cup with milk, and drink freely. If no milk is to be obtained, fill up the cup with hot water.

French Remedy for Chronic Rheumatism.—Dr. Bonnet, of Graulbet, France, states in a letter to the "Abeille Medicale," that he has been long in the habit of prescribing "the essential oil of turpentine by friction for rheumatism; and that he has used it himself with perfect success, having almost instantaneously got rid of rheumatic pains in both knees and in the left shoulder."

Diuretics—Pills, Drops, Decoction, &c.—Solidified copaiba, 2 parts; alcoholic extract of cubebs, 1 part; formed into pills with a little oil of juniper. Dose, 1 or 2 pills 3 or 4 times daily. This pill has been found very valuable in affections of the kidneys, bladder, and urethra, as inflammation from gravel, gonorrhœa, gleet, whites, leucorrhœa, common inflammations, &c. For giving them a sugar coat, see that heading, if desired.

Diuretic Drops.—Oil of cubebs, ¼ oz.; sweet spirits of nitre, ½ oz.; balsam of copaiba, 1 oz.; Harlem oil, 1 bottle; oil of lavender, 20 drops; spirits of turpentine, 20 drops; mix. Dose, 10 to 25 drops, as the stomach will bear, three times daily.

It may be used in any of the above diseases with great satisfaction.

Diuretic Tincture.—Green or growing spearmint mashed, put into a bottle, and covered with gin, is an excellent diuretic.

Diuretic for Children.—Spirits of nitre—a few drops in a little spearmint tea—is all sufficient. For very young children, *pumpkin-seed*, or water-melon seed tea is perhaps the best.

Magnetic Pain Killer, for Toothache and Acute Pain.—Laudanum 1 dr. gum camphor 4 drs. oil of cloves ½ dr. oil of lavender 1 dr. add then to 1 oz. alcohol, 6 drs. sulphuric ether, and 5 fluid drs. chloroform. Apply with lint, or for toothache rub on the gums, and upon the face against the teeth.

Cure for Snake Bites.—The Inspector of Police in the Bengal Government reports that of 939 cases in which ammonia was freely administered 702 victims have recovered, and in the cured instances the remedy was not administered till about 3½ hours after the attack, on the average of the fatal cases the corresponding duration of time was 4½ hours.

Nitrous Oxide, or Laughing Gas.—Take two or three ounces of nitrate of ammonia in crystals and put it into a retort, taking care that the heat does not exceed 500°; when the crystals begin to melt, the gas will be produced in considerable quantities. The gas may also be procured, though not so pure, by pouring nitric acid, diluted with five or six times its weight of water, on copper filings or small pieces of tin. The gas is given out till the acid begins to turn brown; the process must then be stopped.

To Inhale the Laughing Gas.—Procure an oiled or varnished silk bag, or a bladder, furnished with a stop-cock into the mouth and at the same time hold the nostrils, and the sensation produced will be of a highly pleasing nature; a great propensity to laughter, a rapid flow of vivid ideas, and an unusual fitness for muscular exertion, are the ordinary feeling which it produces. The sensation, produced by breathing this gas, are not the same in all persons, but they are of an agreeable nature, and not followed by any depression of spirits like those occasioned by fermented liquors.

Chewing Gum.—Take of prepared balsam of tolu, 2 oz. white sugar 1 oz. oatmeal 3 ozs. soften the gum in a water bath and mix in the ingredients; then roll in finely-powdered sugar or flour to form sticks to suit.

Black Stencil Ink.—Triturate together 1 pt. pine soot and 2 pts Prussian blue with a little glycerine, then add 3 pts. gum arabic and sufficient glycerine to form a thin paste.

Remedy for Small Pox.—Sulphate of zinc 1 gr. foxglove [digitalis,] 1 gr. sugar ½ teaspoonful, mix with 2 teaspoonfuls of water, add 4 oz. of water, dose 1 spoonful every hour, child in proportion. From experience it is known that nothing will break up this frightful disease sooner than continued and persevering bathing with the water at a comfortable temperature. See page 254.

The four following receipts are said to be genuine.

Ayer's Wild Cherry Expectorant.—Mix together 3 grs. acetate of morphia, 2 fluid drs. tinct blood-root, 3 fluid drs. each antimonial wine and ipecacuanha wine, and 3 fluid ozs. syrup of wild cherry bark. Dose 1 teaspoonful in catarrh, bronchitis, and influenza.

Radway's Ready Relief.—According to Peckolt, is an ethereal tincture of capsicum, with alcohol and camphor.

Radway's Renovating Resolvent.—A vinous tincture of ginger and cardamom, sweetened with sugar.

Ayer's Sarsaparilla.—Take 3 fluid ozs. each of alcohol, fluid extracts of *sarsparilla and* of stillingia; 2 fluid ozs. each, extract of *yellow-dock and of podophyllin,* 1 oz. sugar, 90 grs., iodide of *potassium, and 10* grs. iodide of iron.

Inhalation of Tar for Consumption.—Mix together 16 ozs. of liquid tar and 1 fluid oz. liquor of potassa, boil them for a few minutes in the open air, then let it simmer in an iron vessel over a spirit or other lamp in the chamber of the patient. This may at first excite a disposition to cough, but in a short time it allays it, and removes any tendency to it.

Cancer Cure.—Drink a tea made from the tops of red clover; about 1 qt. per day should be taken internally, and the tea should be used as a wash twice per day; very strongly recommended.

Taylor's Remedy for Deafness.—Digest 2 ozs. bruised garlic in 1 lb. oil of almonds for a week and strain. A drop poured into the ear is effective in temporary deafness.

Cure for Earache.—Take equal parts of chloroform and laudanum, dip a piece of cotton into the mixture and introduce into the ear, and cover up and get to sleep as soon as possible.

Ottawa Root Beer.—Take 1 oz. each of sassafras, allspice yellow-dock and winter green; ½ oz. each wild cherry bark and coriander; ¼ oz. hops and 3 qts. molasses. Pour sufficient boiling water on the ingredients and let them stand 24 hours, filter the liquor and add ½ pt. yeast, and it is ready for use in 24 hours,

To Extract Essential Oil from Wood, Barks, Roots Herbs, &c.—Take balm, mint, sage, or any other herb, &c., put it into a bottle, and pour upon it a spoonful of ether; keep in a cool place a few hours, and then fill the bottle with cold water; the essential oil will swim upon the surface and may be easily separated.

Fumigating Paper.—Dip light paper in a solution of alum, strength of alum 1 oz. water 1 pt. Dry thoroughly and on one side spread a mixture of equal parts of gum benzoin, oilbanum, or Peruvian balsam, melt the gums in an earthenware dish and spread with a hot spatula, slips of the paper are held over a light when the odorous matter will be evaporated, the alum preventing the paper from igniting.

Transparent Cement for Glass.—Dissolve 1 part Indian rubber in chloroform, and add 16 parts by measure of gum mastic in powder. Digest for 2 days, shaking the bottle frequently, apply with a fine camel's hair brush.

Mouth Wash.—Proof spirits 1 qt. borax and honey, of each 1 oz. gum myrrh 1 oz. red sanders wood 1 oz. Rub the honey and borax well together in a mortar, then gradually add the spirit, the myrrh and sanders wood and macerate 14 days.

Camphor Soaps.—Curd soap 28 lbs, otto of rosemary 1¼ lbs. Reduce the camphor to powder, add one ounce almond oil then sift it, when the soap is melted and ready to turn out, add the camphor and rosemary

White Windsor Soap.—Curd soap 1 cwt. marine soap 21 lbs. oil soap 14 lbs, oil caraway, 1½ lbs. oil thyme and rosemary of each ½ lb. oils of cassia and cloves of each ¼ lb.

Brown Windsor Soap.—Curd soap ¾ cwt. marine soap ¼ cwt. yellow soap ¼ cwt oil soap, ¼ cwt. Brown coloring (caramel) ½ pt. oils caraway, cloves, thyme, cassia, petit grain and French lavender of each 2 oz,

Sand Soap.—Curd soap 7 lbs. marine soap 7 lbs. sifted silver soap *28 lbs, oils thyme, cassia* caraway and French lavender of each 2 oz

Dropsy.—Syrup and Pills.—Queen-of-the-meadow root dwarf-elder flowers, berries, or inner bark, juniper berries, horse-radish root, pod milkweed, or silkweed, often called, root of each, 4 oz.; prickly-ash bark or berries, mandrake root, bittersweet bark, of the root of each, 2 oz.; white-mustard seed, 1 oz.; Holland gin, 1 pt. Pour boiling water upon all except the gin, and keep hot for 12 hours; then boil and pour off twice, and boil down to 3 qts., and strain, adding 3 lbs. of sugar, and lastly the gin. Dose, take all the stomach will bear, say a wine glass a day, or more.

Dropsy Pills.—Jalap, 50 grs.; gamboge, 30 grs.; podophyllin, 20 grs.; elatarium, 12 grs.; aloes, 30 grs.; cayenne, 35 grs.; Castile soap, shaved and pulverized, 20 grs.; croton oil, 90 drops; powder all finely, and mix thoroughly; then form into pill mass, by using a thick mucilage made of equal parts of gum arabic and gum tragacanth, and divide in three-grain pills. Dose, 1 pill every 2 days for the first week; then every 3 or 4 days, until the water is evacuated by the combined aid of the pill with the alum syrup. This is a powerful medicine, and will thoroughly accomplish its work.

Liver Pill.—Leptandrin, 40 grs.; podophyllin and cayenne, 30 grs. each; sanguinarin, iridin, and ipecac., 15 grs. each; see that all are pulverized and well mixed; then form into pill mass by using ½ dr. of the soft extract of mandrake and a few drops of anise oil, then roll out into three-grain pills. Dose, 2 pills taken at bed-time will generally operate by morning; but some persons require 3.

Irritating Plaster.—Extensively Used by Eclectics.—Tar, 1 lb.; burgundy pitch, ½ oz.; white-pine turpentine, 1 oz.; resin, 2 oz. Boil the tar, resin, and gum together a short time, remove from the fire, and stir in finely pulverized mandrake root, blood root, poke root, and Indian turnip, of each, 1 oz.

Pills.—To Sugar Coat.—Pills to be sugar coated must be very dry, otherwise they will shrink away from the coating; and leave it a shell easily crushed off. When they are dry, you will take starch, gum arabic, and white sugar, equal parts, rubbing them very fine in a marble mortar, and if damp, they must be dried before rubbing together; then put the powder into a suitable pan, or box, for shaking; now put a few pills into a small tin box having a cover, and pour on to them just a little simple syrup, shaking well to moisten the surface only; then throw into the box of powder, and keep in motion until completely coated, dry, and smooth.

If you are not very careful, you will get too much syrup upon the pills; if you do, put in more, and be quick about it to prevent moistening the pill too much, getting them into the powder as soon as possible.

Positive Cure for Hydrophobia.—The dried root of elecampane, pulverize it, and measure out 9 heaping tablespoonfuls, and mix it with 2 or 3 teaspoonfuls of pulverized gum arabic; then divide into 9 equal portions. When a person is bitten by a rabid animal, take one of these portions, and steep it in 1 pt. of new milk, until nearly half the quantity of milk is evaporated; then strain, and drink *it in the morning,* fasting for 4 or 5 hours after. The same dose is to be repeated 3 mornings in succession, then skip 3, and so on, until the 9 doses are taken.

The patient must avoid getting wet, or the heat of the sun, and abstain from high-seasoned diet, or hard exercise, and, if costive, take a dose of salts. The above quantity is for an adult; children will take less according to age.

Eye Preparations.—Eye Water.—Table salt and white vitriol, of each 1 tablespoon; heat them upon copper plates or in earthen ware until dry; the heating drives off the acrid water, called the water of crystallization, making them much milder in their action; now add to them soft water ½ pt.; putting in white sugar, 1 tablespoon; blue vitriol, a piece the size of a common pea. If it should prove too strong in any case, add a little more soft water to a phial of it. Apply it to the eyes 3 or 4 times daily.

India Prescription for Sore Eyes.—Sulphate of zinc, 3 grs.; tincture of opium (laudanum), 1 dr.; rose water, 2 oz.; mix. Put a drop or two in the eye, 2 or 3 times daily.

Another.—Sulphate of zinc, acetate of lead, and rock salt, of each ½ oz.; loaf sugar, 1 oz.; soft water, 12 oz.; mix without heat, and use as other eye waters.

If sore eyes shed much water, put a little of the oxide of zinc into a phial of water, and use it rather freely. This will soon effect a cure.

Copperas and water has cured sore eyes of long standing; and used quite strong, it makes an excellent application in erysipelas.

Indian Eye Water.—Soft water, 1 pt.; gum arabic, 1 oz.; white vitriol, 1 oz.; fine salt, ½ teaspoon; put all into a bottle, and shake until dissolved. Put into the eye just as you retire to bed.

Black Oil.—Best alcohol, tincture of arnica, British oil, and oil of tar, of each 2 oz.; and *slowly* add sulphuric acid, ½ oz.

These black oils are getting into extensive use as a liniment, and are indeed valuable, especially in cases attended with much inflammation.

Vermifuge Lozenges.—Santonin, 60 grs.; pulverized sugar, 5 oz.; mucilage of gum tragacanth, sufficient to make into a thick paste, worked carefully together, that the santonin shall be evenly mixed throughout the whole mass; then, if not in too great a hurry, cover up the mortar in which you have rubbed them, and let stand from 12 to 24 hours to temper; at which time they will roll out better than if done immediately; divide into 120 lozenges. Dose, for a child 1 year old, 1 lozenge, night and morning; of 2 years, 2 lozenges; of 4 years, 3; of 8 years, 4; of 10 years or more, 5 to 7 lozenges; in all cases, to be taken twice daily, and continuing until the worms start on a voyage of discovery.

Harlem Oil or Welsh Medicamentum.—Sublimed or flowers of sulphur and oil of amber, of each 2 oz.; linseed oil, 1 lb.; spirits of turpentine sufficient to reduce all to the consistence of thin molasses. Boil the sulphur in the linseed oil until it is dissolved, then add the oil of amber and turpentine. Dose, from 15 to 25 drops, morning and evening.

Amongst the Welsh and Germans it is extensively used for strengthening the stomach, kidneys, liver, and lungs; for asthma, *shortness of breath,* cough, inward or outward sores, dropsy, worms, gravel, fevers, palpitation of the heart, giddiness, headache, &c., by taking it internally; and for ulcers, malignant sores, cankers, &c., anointing externally, and wetting linen with it, and applying to burns.

EGYPTIAN CURE FOR CHOLERA.—Best Jamaica ginger root, bruised, 1 oz.; cayenne, 2 teaspoons; boil all in 1 qt. of water to ½ pt., and add loaf sugar to form a thick syrup. Dose, 1 tablespoon every 15 minutes, until vomiting and purging ceases; then follow up with a blackberry tea.

INDIAN PRESCRIPTION FOR CHOLERA.—First dissolve gum camphor, ¼ oz., in 1¼ oz. of alcohol; second, give a teaspoon of spirits of hartshorn in a wine glass of water, and follow it every 5 minutes with 15 drops of the camphor in a teaspoon of water, for 3 doses; then wait 15 minutes, and commence again as before; and continue the camphor for 30 minutes, unless there is returning heat. Should this be the case, give one more dose, and the cure is effected; let them perspire freely (which the medicine is designed to cause), as upon this the life depends, but add no additional clothing.

ISTHMUS CHOLERA TINCTURE.—Tincture of rhubarb, cayenne, opium, and spirits of camphor, with essence of peppermint, equal parts of each, and each as strong as can be made. Dose, from 5 to 30 drops, or even to 60, and repeat, until relief is obtained, every 5 to 30 minutes.

KING OF OILS, FOR NEURALGIA AND RHEUMATISM.—Burning fluid, 1 pt.; oils of cedar, hemlock, sassafras, and origanum, of each 2 oz.; carbonate of ammonia, pulverized, 1 oz.; mix. DIRECTIONS.—Apply freely to the nerve and gums around the tooth; and to the face, in neuralgic pains, by wetting brown paper and laying on the parts, not too long, for fear of blistering,—to the nerves of teeth by lint.

NEURALGIA.—INTERNAL REMEDY.—Sal-ammoniac, ½ dr., dissolve in water, 1 oz. Dose, one tablespoon every 3 minutes, for 20 minutes, at the end of which time, if not before, the pain will have disappeared.

ARTIFICIAL SKIN.—FOR BURNS, BRUISES, ABRASIONS, &c.—PROOF AGAINST WATER.—Take gun cotton and Venice turpentine, equal parts of each, and dissolve them in 20 times as much sulphuric ether, dissolving the cotton first, then adding the turpentine; keep it corked tightly. Water does not affect it, hence its value for cracked nipples, chapped hands, surface bruises, &c., &c.

INDIAN BALSAM.—Clear, pale rosin, 3 lbs., and melt it, adding spirits of turpentine, 1 qt., balsam of tolu, 1 oz.; balsam of fir, 4 oz.; oil of hemlock, origanum, with Venice turpentine, of each, 1 oz.; strained honey, 4 oz.; mix well, and bottle. Dose, 6 to 12 drops; for a child of six, 3 to 5 drops, on a little sugar. The dose can be varied according to the ability of the stomach to bear it, and the necessity of the case.

It is a valuable preparation for coughs, internal pains, or strains, and works benignly upon the kidneys.

WENS—TO CURE.—Dissolve copperas in water to make it very strong; now take a pin, needle, or sharp knife, and prick, or cut the wen in about a dozen places, just sufficient to cause it to bleed; then wet it thoroughly with the copperas water, once daily.

Bronchocele.—Enlarged Neck.—To Cure.—Iodide of potassium (often called hydriodate of potash), 2 drs.; iodine, 1 dr.; water, 2½ oz.; mix and shake a few minutes, and pour a little into a phial for internal use. Dose, 5 to 10 drops before each meal, to be taken in a little water. External Application.—With a feather, wet the enlarged neck, from the other bottle, night and morning until well.

It will cause the scarf skin to peel off several times before the cure is perfect, leaving it tender, but do not omit the application more than one day at most, and you may rest assured of a cure, if a cure can be performed by any means whatever.

Dalby's Carminative.—Magnesia, 2 drs.; oil peppermint, 3 drops; oil nutmeg, 7 drops; oil anise, 9 drops; tinct. of castor, 1½ drs.; tinct. of assafœtida, 45 drops; tinct. of opium, 18 drops; essence penny-royal, 50 drops; tinct. of cardamoms, 95 drops; peppermint water, 7 oz.; mix.

Positive Cure for Diarrhœa.—Take 2 wine glasses of vinegar, and one tablespoonful of salt. Mix the whole thoroughly to dissolve the salt. Add 7 to 10 drops of laudanum, according to the age or strength of the patient, and give the whole at one dose.

Cure for Ague.—Cut three lemons into thin slices and pound them with a mallet, then take enough coffee to make a quart, boil it down to a pint and pour it while quite hot over the lemons. Let it stand till cold, then strain through a cloth, and take the whole at one dose, *immediately after* the chill is over, and *before* the fever comes on.

To Improve the Voice.—Beeswax, 2 drs.; copaiba balsam, 3 drs.; powder of liquorice root, 4 drs.; melt the copaiba balsam with the wax in a new earthen pipkin; when melted, remove them from the fire, and mix in the powder; make the pills of 3 grs. each. Two of these pills to be taken occasionally, 3 or 4 times a day. Very best known.

Signs of Disease in Children.—In the case of a baby not yet able to talk, it must *cry* when it is ill. The *colic* makes a baby cry loud, long, and passionately, and shed tears—stopping for a moment and beginning again.

If the chest is affected, it gives *one* sharp cry, breaking off immediately, as if crying hurt it.

If the head is affected, it cries, in *sharp, piercing shrieks*, with *low moans and wails between*. Or there may be quiet dozing, and startings between.

It is easy enough to perceive, where a child is attacked by disease, that there is some change taking place; for either its skin will be dry and hot, its appetite gone; it is stupidly sleepy, or fretful and crying; it is thirsty, or pale and languid, or in some way betrays that something is wrong. When a child vomits, or has a diarrhœa, or is costive and feverish, it is owing to some derangement, and needs attention. But these various symptoms may continue for a day or two before the nature of the disease can be determined. A warm bath, warm drinks, etc., can do no harm, and may help to *determine the case*. On coming out of the bath, and being well rubbed with the hand, the skin will show symptoms of rash, if it is a skin disease which has commenced. By the appearance of the rash, the nature of the disease can be learned. Measles are in patches, dark red, and come out first about the face. If scarlet fever is impending, the skin will look a deep pink all over the body, though most so about the neck and face. Chicken-pox shows fever, but not so much running at the nose, and appearances of cold, as in measles, nor is there as much of a cough. Besides, the spots are smaller, and do not run much together, and are more diffused over the whole surface of the skin; and enlarge into little blisters in a day or two.

Let the room where the child is sick be shady, quiet, and cool. Be careful not to speak so suddenly as to startle the half-sleeping patient, and handle it with the greatest tenderness when it is necessary to move it. If it is the lungs that suffer, have the little patient somewhat elevated upon the pillows for easier breathing, and do everything to soothe and make it comfortable, so as not to have it cry, and thus distress its inflamed lungs. If the child is very weak, do not move it too suddenly, as it may be startled into convulsions. In administering a bath, the greatest pains must be taken not to frighten the child. It should be put in so gradually, and so amused by something placed in the water on purpose as to forget its fear; keep up a good supply of fresh air, at a temperature of about 60° Fah. If a hired nurse *must* be had, select if possible a woman of intelligence, gentle and loving disposition, kind and amiable manners, and of a most pacific, unruffled, and even temper. If a being can be got possessed of these angelic qualities, and we believe there are many such, you will be quite safe in intrusting to her care the management of your sick child, or yourself either, in case of sickness. She should not be under twenty-five nor over fifty-five, as between these two ages she will, if healthy, be in her full strength and capacity.

HOOPING COUGH.—To empty the child's stomach by a lobelia emetic, is the first step. After this make a syrup of sugar, ginger-root, a little water, and enough lobelia tincture to produce a slight nausea. This, given two or three times a day, will loosen the cough very much. For croup remedy, see "Lock jaw cure," and "Croup cure."

DIARRHŒA.—Nothing is better for looseness of the bowels than tea made of ground bayberry. Sweeten it well, and give a half-teacupful once in two hours, until the child is better. Bathing must not be neglected.

COLIC.—This can be cured with warm injections, of simple soap-suds, or warm water with a warming tincture in it. A little warm tea may be given at the same time, and the bowels rubbed. Every family should have a small and large syringe. Nothing is oftener needed, particularly in the care of children.

FEVER.—Where a child has a simple fever from teething, or any other cause not connected with acute disease, give a teaspoonful of syrup of rhubarb, a warm injection, and sponge-baths. These will generally be all that is needed.

RICKETS and SCROFULA.—If children have either of these, or both these *diseases*, a good, nutritive diet is a great essential.

Then the alkaline-bath, a little lime-water, say a teaspoonful three times a day, and out-door exercise, are the chief remedies.

FITS—SPASMS—When these are brought on by indigestion, place the child in a warm bath immediately, give warm water, or a lobelia emetic, rub the skin briskly, etc., to get up an action. In brain disease the warm water is equally useful. In fact, unless the fit is constitutional, the warm bath will relieve the patient by drawing the blood to the surface.

ENLARGEMENT OF THE BRAIN.—This chiefly affects children, and consists in an unnatural growth of the brain. The skull may grow with it, and there be no symptoms of disease, though children with this large brain are apt to die of some brain disease. The *symptoms* of enlargement of the brain are, dullness of intellect, indifference to external objects, irritable temper, inordinate appetite, giddiness, and habitual headache. Sometimes there are convulsions, epileptic fits, and idiocy. There is also a peculiar projection of the parietal bones in this disease.

Treatment.—As much as possible, repress all exercise of the mind. Do not suffer the child to go to school; but put it to the most active and muscular exercise in the open air. The moment there is any heat in the top of the head, apply cold water, ice, or cold evaporating lotions. The diet should be very simple, bread and milk only, if, as the child grows up, the signs of disease increase.

WATER IN THE HEAD.—Another disease of children, and especially of scrofulous children. It is inflammatory, and should be early noticed.

Symptoms.—Capricious appetite, a foul tongue, offensive breath, enlarged, and sometimes tender belly, torpid bowels, stools light-colored from having no bile, or dark from vitiated bile, fetid, sour-smelling, slimy and lumpy. The child grows pale and thin; and is heavy, languid, dejected; it is fretful, irritable, uneasy, and apt to be tottering in its gait.

The disease may begin, after these symptoms, by pains in the head, becoming more severe and frequent, sharp and shooting, causing the child to waken and shriek out. As the drowsy state advances, the shrieking gives place to moaning. There is great stiffness in the back of the neck, pain in the limbs, tenderness in the scalp, vomiting, sighing, intolerance of light, knitting of the brows, and increased disturbance of the stomach and bowels. This may last from ten to fourteen days, the patient growing more weak and peevish.

Another form of attack is marked by acute pain in the head, high fever, convulsions, flushed face, brilliant eyes, intolerance of light and sound, pain and tenderness in the belly, stupor, great irritability of stomach, causing retching and vomiting on every attempt to sit up.

The third mode of attack is very insidious—the early symptoms being so mild as hardly to be noticed. In this case, the convulsions or palsy come suddenly, without notice, bringing swift and unexpected destruction. In the first stage of the disease there is *increased sensibility;* in the second, decreased sensibility; in the third, palsy, convulsions, squinting of the eyes, rolling of the head, stupor, and a rapid, thread-like pulse.

Treatment.—In the first stage, purging is very important, and must be continued for three or four days. An excellent purgative is this: pulverized scammony, six grains; croton oil, four drops; pulverized loaf sugar, sixteen teaspoonfuls. Rub well together in a mortar. Give one teaspoonful every hour or two, till it operates. Apply cold water or ice to the head. In the second stage put blisters upon the back of the neck, and one on the bowels, if very tender. In the third stage use the warm bath, also alteratives and diuretics. For an alterative, use iodide of potassium, one dram; water, half an ounce; mix. Thirty drops to a child seven years old every hour. For a diuretic, use tincture of digitalis, one ounce; syrup of squills, one ounce; mix. Ten drops for a child seven years old every four hours. The patient should be kept in a dark room, away from all noise and excitement, and should lie upon a hair mattress, with his head somewhat elevated. The diet in the first stage should be nothing more than gruel; after that, more nourishing, but easy of digestion, such as beef-tea, plain chicken-broth, animal-jellies, etc. At the same time the patient should be supported by the cautious use of wine-whey, valerian, or ten drops of aromatic spirits of ammonia every four hours.

Mumps.—This disease, most common among children, begins with soreness and stiffness in the side of the neck. Soon a swelling of the paratoid gland takes place, which is painful and continues to increase for four or five days, sometimes making it difficult to swallow, or open the mouth. The swelling sometimes comes on one side at a time, but commonly upon both. There is often heat and sometimes fever, with a dry skin, quick pulse, furred tongue, constipated bowels, and scanty and high-colored urine. The disease is contagious.

Treatment.—Keep the face and neck warm, and avoid taking cold. Drink warm herb-teas, and if the symptoms are severe, 4 to 6 grs. of Dover's powder; or if there is costiveness, a slight physic, and observe a very simple diet. If the disease is aggravated by taking cold, and is very severe, or is translated to other glands, physic must be used freely, leeches applied to the swelling, or cooling lotions and poultices. Sweating must be resorted to in this case.

Scarlet Fever is an acute inflammation of the skin, both external and internal, and connected with an infectious fever.

Symptoms.—The fever shows itself between two and ten days after exposure. On the second day of the fever the eruption comes out in minute pimples, which are either clustered together, or spread over the surface in a general *bright scarlet color.* The disease begins with langour, pains in the head, back, and limbs, drowsiness, nausea and chills, followed by heat and thirst. When the redness appears the pulse is quick, and the patient is restless, anxious and often delirious. The eyes are red, the face swollen, and the tongue covered in the middle with white mucus, through which are seen elevated points of extreme redness. The tonsils are swollen, and the throat is red. By the evening of the third or fourth day the redness has reached its height, and the skin becomes moist, when the scarf-skin begins to come off in scales.

In this fever the flesh puffs up so as to distend the fingers, and disfigure the face. As it progresses the coating suddenly comes off the tongue, leaving it and the whole mouth raw and tender. The throat is very much swollen and inflamed, and ulcers form on the tonsils. The eustachian tube which extends up to the ear, the glands under the ear and jaw, sometimes inflame and break; and the abscesses formed in the ear frequently occasion deafness more or less difficult to cure. The symptoms of this disease may be distinguished from that of measles by the absence of cough; by the finer rash; by its scarlet color; by the rash appearing on the second instead of the fourth day; and by the ulceration of the throat.

Treatment.—In ordinary cases the treatment required is very simple. The room where the patient lies should be kept cool, and the bed-covering light. The whole body should be sponged with cool water as often as it becomes hot and dry, and cooling drinks should be administered. A few drops of belladonna, night and morning, is all that is needed.

If there is much fever and soreness of throat, give the following tincture of hellebore often enough to keep down the pulse:—

Tincture of American hellebore, 1 dr.; tincture of black cohosh, 2 oz.; mix. Take one teaspoonful 3 to 6 times a day.

It would also be useful to commence treatment with an emetic; and to soak the feet and hands in hot water containing a little mustard or cayenne pepper; continuing this bath 20 minutes, twice a day, for 2 or 3 days. The cold stage being passed, and the fever having set in, warm water may be used without the mustard or pepper. If the head is affected, put drafts upon the feet; and if the bowels be costive, give a mild physic. Solid food should not be allowed; but when the fever sets in, cooling drinks, such as lemonade, tamarind-water, rice-water, flaxseed tea, then gruel, or cold water may be given in reasonable quantities. To stimulate the skin, muriatic acid, 45 drops in a tumbler filled with water and sweetened, and given in doses of a teaspoonful, is a good remedy.

Where the disease is very violent, and the patient inclines to sink immediately; where typhoid symptoms appear and there is great prostration; the eruption strikes in; the skin changes to a mahogany color; the tongue is a deep red, or has on it a dark brown fur, and the ulcers in the throat become putrid, the treatment must be different from the above. In this case it must be *tonic*. Quinia must be given freely; and wine whey, mixed with toast-water, will be useful. Quinia is made as follows:—Sulphate of quinine, 1 scruple; alcohol, 4 ozs.; sulphuric acid, 5 drops; Madeira wine, 1 quart; mix. Two wine-glassfuls a day. Tincture of cayenne, in sweetened water, may be given in small doses. Gargles are also necessary. A good one is made of pulverized cayenne, 1 dram; salt, one dram; boiling water, 1 gill. Mix, and let them stand 15 minutes. Then add 1 gill vinegar. Let it stand an hour and strain. Put a teaspoonful in the child's mouth once in an hour. A warm bath should be used daily as soon as the skin begins to peel off, to prevent dropsy. If dropsy sets in, the bath once in 3 days is sufficient, and sweating should be promoted by giving the tincture of Virginia snake-root and similar articles; a generous diet should be allowed at the same time, to bring up the child's strength.

MEASLES is an acute inflammation of the skin, internal and external, combined with an infectious fever.

Symptoms. Chills succeeded by great heat, langour, and drowsiness, pains in the head, back and limbs, quick pulse, soreness of throat, thirst, nausea and vomiting, a dry cough, and high colored urine. These symptoms increase in violence for four days. The eyes are inflamed and weak, and the nose pours fourth a watery secretion, with frequent sneezing. There is considerable inflammation in the larynx, wind-pipe and bronchial tubes, with soreness of the breast and hoarseness. About the fourth day the skin is covered with a breaking out which produces heat and itching, and is red in spots, upon the face first, gradually spreading over the whole body. It goes off in the same way, from the face first and then from the body, and the hoarseness and other symptoms decline with it; at last the outside skin peels off in scales.

Treatment. In a mild form, nothing is required but a light diet, slightly acid drinks, and flax seed or slippery elm tea. Warm herb teas, and frequent sponge baths with tepid water, serve to allay the fever; care should be taken not to let the patient take cold. If the fever is very high, and prevents the rash coming out, a slight dose of salts, or a nauseating dose of ipecac., lobelia, or hive-syrup should be given, and followed by teaspoonful doses of compound tincture of Virginia snake-root until the fever is allayed. If the patient from any derangement takes on a low typhoid type of fever, and the rash does not come out until the seventh day, and is then of a dark and livid color, tonics and stimulants must be given, and expectoration promoted by some suitable remedy. There is always danger of the lungs being left in an inflamed state after the measles, unless the greatest care is taken not to suffer the patient to take cold. Should there be much soreness or pain, and a severe cough, this must be treated as a separate disease, with other remedies.

Symptoms. TYPHOID FEVER is generally preceded by several days of languor, low spirits, and indisposition to exertion. There is also, usually, some pain in the back and head, loss of appetite, and drowsiness, though not rest. The disease shows itself by a chill. During the first week there is increased heat of the surface, frequent pulse, furred tongue, restlessness, sleeplessness, headache and pain in the back; sometimes diarrhœa and swelling of the belly, and sometimes nausea and vomiting.

The second week is often distinguished by small, rose-colored spots on the belly, and a crop of little watery pimples on the neck and chest, having the appearance of minute drops of sweat; the tongue is dry and black, or red and sore; the teeth are foul; there may be delirium, and dullness of hearing; and the symptoms every way are more serious than during the first week. Occasionally, the bowels are at this period perforated or ate through by ulceration, and the patient suddenly sinks. If the disease proceeds unfavorably into the third week, there is low, muttering delirium; great exhaustion; sliding down of the patient toward the foot of the bed; twitching of the muscles; bleeding from the bowels; and red or purple spots upon the skin.

If, on the other hand, the patient improves, the countenance brightens up, the pulse moderates, the tongue cleans, and the discharges look healthy.

Treatment. Give the patient good air, and frequent spongings with water, cold or tepid, as most agreeable. Keep the bowels in order, and be more afraid of diarrhœa than costiveness. Diarrhœa should be restrained by a little brandy, or by repeated doses of Dover's powder. For costiveness, give mild injections, made slightly loosening by castor oil, or common molasses. To keep down the fever, and produce perspiration, give tincture of veratrum viride, 10 drops every hour. If the bowels are swelled, relieve them by hot fomentations of hops and vinegar. If the pain in the head is very severe and constant, let the hair be cut short, and the head bathed frequently with cold water. Give light nourishment, and if the debility is great, broth and wine will be needed. Cleanse the mouth with very weak tea—old hyson. If the fever runs a low course, and the patient is very weak, quinine may be given from the beginning. Constant care and good nursing are very important.

Typhus fever is distinguished from typhoid by there being no marked disease of the bowels in typhus.

GROCERS AND CONFECTIONERS' RECEIPTS.

Cheap Vinegar.—Mix 25 gals. of warm rain water with 7 gals. molasses and 5 gals. yeast, and let it ferment, you will soon have the best of vinegar, keep adding these articles in these proportions as the stock is sold.

For Grocers' Sales.—Take three barrels; let one of them be your vinegar barrel; fill this last up before it is quite empty, with molasses, 2 gals.; soft water, 11 gals.; yeast, 1 qt.; keeping these proportions in filling up the whole three barrels; sell the vinegar out of your old vinegar barrel as soon as it is ready, which will be in a short time; when nearly empty, fill it up with the fluid as before, and pass on to sell out of the next barrel; by the time it is disposed of go on to the last; then go back to the first, filling up your barrels in every case when nearly empty, and you will always keep a stock of good vinegar on hand unless your sales are very large; in which case, follow the next process. Have the bung-holes open in the barrels to admit air.

Vinegar in Three Days.—Get a quantity of maple, beech, or basswood chips or shavings, and soak these in good vinegar for two or three days. With these chips you will fill a barrel, which has been pierced with a large number of inch holes all around the sides for the free admission of air among the chips (the more holes *in the barrel the* better, for the more air the sooner the vinegar will be made); cut another barrel in two halves, place one half below the barrel with the chips and the other half above it. The top tub must have its bottom pierced with a number of gimlet holes, in which are placed several threads of twine, to conduct the vinegar evenly over the chips. The liquid drains down slowly through the chips and out of a faucet near the bottom of the barrel into the lower tub. It should run through every four hours, and then be baled or pumped back. Directions to make vinegar from sugar: Use 1½ lb. to each gal. of water; of the dregs of molasses barrels, use 2 lbs. to each gal. water; small beer, lager beer, ale, &c., which have become sour, make good vinegar by being reduced with water; small beer needs but little water, lager beer as much water as beer; to 2 gals. cider add ½ gal. of water; you can also make excellent vinegar out of the artificial cider mentioned below. Use, in every case, soft water to make vinegar, and use 2 qts. yeast to every barrel. It makes much quicker if the fluid is slightly lukewarm. Leach either of these preparations through the shavings.

This process should be attended to during warm weather, or in a room where a pretty high temperature is kept up, as it will not work otherwise.

Excellent Vinegar, Cheap.—Acetic acid, 5 lbs.; molasses, 1 gal.; yeast, 2 qts.; put them into a forty-gal. cask, and fill it up with rain water; stir it up, and let it stand one to three weeks, letting it have all the air possible, and you will have good vinegar. If wanted stronger, add more molasses. Should you at any time have weak vinegar on hand, put molasses into it to set it working. This will soon correct it.

White Wine Vinegar.—Mash up 20 lbs. raisins, and add 10 gals. water; let it stand in a warm place for one month, and you will have pure white wine vinegar. The raisins may be used a second time the same way.

To Preserve Eggs.—To each patent pailful of water, add 1 pt. of fresh slacked lime, and 1 pt. of common salt; mix well. Fill your barrel half full with this fluid, put your eggs down in it any time after June, and they will keep two years if desired.

Liquid Mucilage.—Fine clean glue, 1 lb.; gum arabic, 10 oz.; water, 1 qt.; melt by heat in a glue kettle or water bath; when entirely melted, add slowly 10 oz. strong nitric acid, set off to cool. Then bottle, adding a couple of cloves to each bottle.

Baking Powders, *very healthy.*—Baking soda, 6 lbs.; cream of tartar, 8 lbs. Dry each kind separately and thoroughly then mix all together and put up in damp proof packages, glass or tin is best, to be used in the proportion of 1 teaspoonful to each qt. of flour, mix up with cold water and put in the oven immediately.

Candied Lemon Peel.—Take lemon peels and boil them in syrup; then take them out, and dry.

Transparent Soap.—Slice 6 lbs. nice yellow bar-soap into shavings; put into a brass, tin or copper kettle, with alcohol, ½ gal. heating gradually over a slow fire, stirring till all is dissolved; then add 1 oz. sassafras essence, and stir until all is mixed; now pour into pans about 1½ inches deep, and when cold cut into square bars the length or width of the pan, as desired.

English Bar-Soap.—Six gals. soft water; 6 lbs. good stone lime; 20 lbs. sal-soda; 4 oz. borax; 15 lbs. fat (tallow is best); 10 lbs. pulverized resin, and 4 oz. bees'-wax; put the water in a kettle on the fire, and when nearly boiling add the lime and soda; when these are dissolved, add the borax; boil gently, and stir until all is dissolved; then add the fat, resin, and bees-wax; boil all gently until it shows flaky on the stick, then pour into moulds.

Best Soft Soap.—Mix 10 lbs. potash in 10 gals. warm soft water over night; in the morning boil it, adding 6 lbs. grease; then put all in a barrel, adding 15 gals. soft water.

Soap without Lye or Grease.—In a clean pot put ½ lb. home-made hard or mush soap, and ½ lb. sal-soda, and 5 pts. of soft water. Boil the mixture 15 minutes, and you will have 5 lbs. good soap for 7½ cents.

Hard Soap.—Take 5 lbs. hard soap, or 7 lbs. soft soap, and 4 lbs. sal-soda, and 2 oz. borax, and 1 oz. hartshorn; boil one quarter hour with 22 qts. water; add, to harden, ½ lb. resin.

German Yellow Soap.—Tallow and sal-soda, of each 112 lbs., resin, 56 lbs.; stone lime, 28 lbs.; palm oil, 8 oz.; soft water, 28 gals. Put soda, lime, and water into a kettle and boil, stirring well; then let it settle, and pour off the lye. In another kettle, melt the tallow, resin, and palm oil; having it hot, the lye being also boiling hot, mix all together, stirring [illegible] and the work is done.

For small Quantities.—Tallow and sal-soda, each, 1 lb.; resin, 7 oz.; stone lime, 4 oz.; palm oil, 1 oz.; soft water, 1 qt.

Hard Soap with Lard.—Sal-soda and lard, each 6 lbs.; stone lime, 3 lbs.; soft water, 4 gals.; dissolve the lime and soda in the water by boiling, stirring, settling, and pouring off; then return to the kettle (brass or copper), and add the lard, and boil it till it becomes soap; then pour into a dish or moulds; and, when cold, cut into bars, and dry it.

White Hard Soap with Tallow.—Fresh slacked lime, sal-soda, and tallow, of each, 2 lbs.; dissolve the soda in 1 gal. boiling soft water; now mix in the lime, stirring occasionally for a few hours; after which, let it settle, pouring off the clear liquor, and boiling the tallow therein until it is all dissolved; cool it in a flat box or pan, cut into bars or cakes as desired. It may be perfumed with sassafras oil or any other perfume desired, stirring it in when cool.

One Hundred Pounds Soap, very cheap.—Potash, 6 lbs.; lard, 4 lbs.; resin, ¼ lb. Beat up the resin, mix all together, and set aside for five days; then put the whole into a 10-gal. cask of water, and stir twice a day for ten days, when it is ready for use.

Solid Candles from Lard.—Dissolve ¼ lb. alum and ¼ lb. saltpetre in ½ pt. water on a slow fire; then take 3 lbs. of lard cut into small pieces, and put into the pot with this solution, stirring it constantly over a very moderate fire until the lard is all dissolved; then let it simmer until all steam ceases to rise and remove it at once from the fire. If you leave it too long it will get discolored. These candles are harder and better than tallow.

Tallow—To Cleanse and Bleach.—Dissolve alum, 5 lbs. in water, 10 gals., by boiling; and when it is all dissolved, add tallow, ı.; continue the boiling for an hour, constantly stirring and ning; when sufficiently cool to allow it, strain through thick n; then set aside to harden; when taken from the water, lay for a short time to drip.

TATION WAX CANDLES.—Purify melted tallow by throwing in ered quick lime, then add two parts wax to one of tallow, and st beautiful article of candle, resembling wax, will be the ː. Dip the wicks in lime water and saltpetre on making. To lon of water add 2 oz. saltpetre and ½ lb. of lime; it improves ght, and prevents the tallow from running.

AMANTINE CANDLES FROM TALLOW.—Melt together 10 oz. mutallow; camphor, ¼ oz.; bees-wax, 4 oz.; alum, 2 oz. Very hard lurable, burning with a clear, steady light.

AS.—The names of the different kinds of tea relate to the time ir being gathered, or to some peculiarity in their manufacture. ı general rule, that all tea is fine in proportion to the tenderand immaturity of the leaves. The quality and value of lifferent kinds diminish as they are gathered later in the n.

ACK TEAS.—As soon as the leaf-bud begins to expand, it is red to make *Pekoe*. A few days' later growth produces black d Pekoe. The next picking is called *Souchong*; as the leaves larger and more mature, they form *Cougou*; and the last pick- *Bohea*.

hea is called by the Chinese, *Ta-cha* (large tea), on account maturity and size of the leaves; it contains a larger propor- of woody fibre than other teas, and its infusion is of a darker and coarser flavor

gou, the next higher kind, is named from a corruption of the se *Koong-foa* (great care, or assiduity). This forms the bulk black tea imported, and is mostly valued for its strength.

chong—Seaoa-choong (small scarce sort), is the finest of the gest black tea, with a leaf that is generally entire and curly. nuch esteemed for its fragrance and fine flavor.

oe is a corruption of the Canton name, *Pak-ho* (white down), the first sprouts of the leaf-buds; they are covered with a silky down. It is a delicate tea, rather deficient in strength, principally used for flavoring other teas.

EEN TEAS.—The following are the principal kinds *Twankay*, *ı-Skin*, *Hyson*, *Gunpowder*, and *Young Hyson*.

ng Hyson is a delicate young leaf, called in the original lan-, *Yu-tsien* (before the rains), because gathered in the early ;.

son, from the Chinese word *He-tchune*, which means, flourish- ring. This fine tea is gathered early in the season, and pre- with great care and labor. Each leaf is picked separately, ipped off above the footstalks; and every separate leaf is in the hand. It is much esteemed for its flavor.

powder Tea is only Hyson rolled and rounded to give it the *ar* appearance whence it derives its name. The Chinese call *o-cha* (pearl tea).

on-Skin is so named from the Chinese term, in which con- n *skin means the* refuse, or inferior portion. In preparing

Hyson, all leaves that are of a coarse yellow, or imperfectly twisted appearance, are separated, and sold as *skin-tea*, at an inferior price. *Twankay* is the last picking of green tea, and the leaf is not rolled or twisted as much as the dearer descriptions. There is altogether less trouble bestowed on the preparation.

COFFEES.—JAVA COFFEE.—Use of the imported article, 20 lbs.; dried dandelion root, 7 lbs.; chiccory, 13 lbs. Roast and grind well together.

FOR WEST INDIA, use rye roasted with a little butter, and ground very fine.

FOR TURKEY COFFEE, use rice or wheat roasted with a little butter, 7 lbs.; chiccory, 3 lbs.; grind.

ESSENCE OF COFFEE is made by boiling down molasses till hard; grind to a powder; add ½ lb. of good Java coffee to every 4 lbs. of the mixture. Put up for sale in round tin cans or air-tight paper packages.

COFFEE FOR POUND PACKAGES.—Best Java coffee, 1 lb.; rye, 3 lbs.; carefully clean the rye from all bad grains, wash to remove dust, drain off the water, and put the grain into your roaster, carefully stirring to brown it evenly. Brown the rye and coffee separately, grind, and put up in tight packages to preserve the aroma.

MANUFACTURING AND FLAVORING TOBACCO.—After the tobacco is properly cured and sweated, you will, preparatory to pressing, proceed to flavor it as follows: Take 1 oz. tonqua beans; 6 oz. liquorice, 1 lb. sugar; pulverize each completely; add the ingredients to 1 gallon water. Macerate and rummage up for a few days till the aromatic flavor is properly imparted to the liquid. Then spread out some tobacco leaves, and slightly sprinkle them with the above fluid till enough is absorbed to render them pliable. Then roll them up in round packages of such a size that ten will make 1 lb.; then reduce them into flat plugs in a powerful press. A large number of such plugs are subsequently pressed into blocks, when they are ready for the market at once. The strength of the above liquid may be increased or diluted as desired by the manufacturer, and extract of vanilla may be substituted for the tonqua bean.

FLAVOR FOR CIGAR MAKERS.—Take 2 ozs. tonqua beans and 1 oz. cinnamon; bruise and pulverize them to a powder, and put them into 1 pint of Santa Cruz rum; let it stand for a few days to macerate; stir all together, and with this liquid sprinkle your common or inferior tobacco. Dry out of the sun, and the flavor will be unequalled.

TO CURE BUTTER.—Take 2 parts of fine salt; 1 part loaf sugar; 1 part saltpetre; mix completely. Use 1 oz. of this mixture to each pound of butter; work well. Bury your butter firkins in the earth in your cellar bottom, tops nearly level with the ground, or store away in a very cool place, covering the butter with a clean cloth and a strong brine on the top, and it will keep two years if desired

UNERRING TESTS FOR GOOD FLOUR.—Good flour is white, with a yellowish or straw-colored tint. Squeeze some of the flour in your hand; if good, it will retain the shape given by pressure.

Knead a little between your fingers; if it works soft and sticky, it is poor. Throw a little against a dry perpendicular surface; if it fall like powder, it is bad.

To **Correct Musty Flour.**—Carbonate of magnesia, 3 lbs.; flour, 765 lbs.; mix. This improves bad flour, causing it to become more wholesome, producing lighter and better bread than when alum is used, and aborbs and dissipates the musty smell.

Ærated Bread.—1 lb. flour, 100 grs. carb. of soda; 60 grs. common salt; 1 teaspoon powdered sugar; 120 grs. muriatic acid, more or less according to its strength; 1 wine pt. of water, inferior flour will require less. Well mix the flour, soda, salt, and sugar in an earthen vessel, then add the acid mixed with the water, stir with a wooden spoon. Bake in one loaf about 1 hour. Bake in tin or iron pans, but avoid the use of metallic vessels or spoons while mixing.

Patent Self-Raising Flour.—Kiln-dried flour, 1 cwt.; tartaric acid, 10½ oz.; mix thoroughly. After 2 or 3 days, add, of bicarb. soda, 12 oz.; lump sugar, ½ lb.; common salt, 1½ lb. Mix, and pass through the "dressing-machine." Have all the articles perfectly dry, and separately reduce to fine powder before adding to the flour. Mix with cold water, and bake at once. It produces light and porous bread.

Tomato Catsup.—Boil 1 bushel of tomatoes till they are soft; squeeze them through a fine wire sieve; add 1½ pts. salt, 2 oz. cayenne pepper, and 5 heads of onions, skinned and separated; mix together, and boil till reduced one half; then bottle.

The Northern-Light Burning Fluid.—Get good deodorized benzine, 60 to 65 gravity, and to each brl. of 42 gals. add 2 lbs. pulverized alum, 3½ oz. gum camphor, and 3½ oz. oil of sassafras, or 2 oz. oil bergamot; stir up and mix thoroughly together, and it will soon be ready for use. N.B.—As this fluid creates a much larger volume of light and flame than carbon oil, it is necessary to use either a high burner, such as the sun burner, to elevate the flame away from the lamp, in order to keep it cool, or instead thereof, to use a burner provided with a tube for the escape of the gas generated from the fluid, such, for instance, as the meridan burner.

Test for Burning Oil.—Heat water in a pot on the fire to 120° Fahr. Take a tin and put in it a tablespoonful of the oil you wish to test, place the tin containing the oil in the hot water, let it cool down to 112° Fahr.; when at this point, approach a light very cautiously towards the oil, and if it takes fire before the light touches it you will be safe in rejecting it.

Tabac Perfumee aux Fleurs is made by putting orange flowers, jasmines, tube roses, musk roses, or common roses, to snuff in a close chest or jar, sifting them out after 24 hours, and repeating if necessary.

Maccaboy Snuff is imitated by moistening the tobacco with a mixture of treacle and water, and allowing it to ferment.

Spanish Snuff is made from unsifted Havana snuff, reduced by adding ground *Spanish nutshells*, sprinkling the mixture with treacle water, and allowing it to sweat for some days before packing.

Yellow Snuff is prepared from ordinary *pale snuff*, moistened with a mixture of *yellow ochre* diffused in *water*, to which a few spoonfuls of thin *mucilage* has been added.

Perfumes for Snuff.—Tonqua beans, essence of ditto, ambergris, musk civet, leaves of orchis fusca and essence of orris root, essence or oils of bergamot, cedra, cloves, lavender, petit grain, neroli and roses, as well as several others, either alone or compounded.

Preserved or Solidified Milk.—1. Fresh-skimmed milk, 1 gal.; sesquicarbonate of soda (in powder), 1½ dr. Mix; evaporate to ¼ part by heat of a steam or water-bath, with constant agitation; then add of powdered sugar 6½ lbs. and complete the evaporation at a reduced temperature. Reduce the dry mass to powder, add the *cream* well drained, which was taken from the milk. After thorough admixture, put the whole into well-stopped bottles or tins, and hermetically seal. 2. Carbonate of soda, ½ dr.; water, 1 fluid oz.; dissolve; add of fresh milk, 1 qt.; sugar, 1 lb.; reduce by heat to the consistence of a syrup, and finish the evaporation on plates by exposure, in an oven. *Observe*—About 1 oz. of the powder agitated with 1 pt. of water forms an agreeable substitute for milk.

Sealing-wax, Red.—Shellac (very pale), 4 oz.; cautiously melt in a bright copper pan over a clear charcoal fire; when fused, add Venice turpentine, 1¼ oz. Mix, and further add vermilion, 3 oz.; remove the pan from the fire, and pour into mould. For a *black* color, use ivory black, or lampblack, instead of the vermilion; for a *blue color*, use Prussian blue instead of the vermilion, same quantity. Each color must be well mixed with the composition; of the lampblack, use only sufficient to color.

Horticultural Ink.—Copper, 1 part; dissolve in nitric acid, 10 parts, and add water, 10 parts; used to write on zinc or tin labels.

Bottle Wax—Black.—Black resin, 6½ lbs.; beeswax, ½ lb.; finely powdered ivory black, 1½ lbs. Melt together. **Red**, as the last, but substitute Venetian red, or red lead, for the ivory black.

Gold-colored Sealing-wax.—Bleached shellac, 3 lbs.; Venice turpentine, 1 lb.; Dutch leaf ground fine, 1 lb., or less. The leaf should be ground or powdered sufficiently fine, without being reduced to dust. Mix with a gentle heat, and pour into moulds.

Lithographic Ink.—Venice turpentine 1 part, lampblack 2 parts, hard tallow soap 6 parts, mastic in tears, 8 parts, shellac 12 parts, wax 16 parts; melt, stir, and pour it out on a slab.

Fine Black writing Ink.—To 2 gals. of a strong decoction of logwood, well strained, add 1½ lbs. blue galls in coarse powder 6 ozs. sulphate of iron, 1 oz. acetate of copper, 6 ozs. of well ground sugar, and 8 oz. gum arabic. Set the above on the fire until it begins to boil; strain, and then set it away until it has acquired the desired black.

Green Ink.—Cream of tartar 1 part, verdigris 2 parts, water 8 parts. Boil till reduced to the proper color.

Blue Ink.—Take sulphate of indigo, dilute it with water till it produces the required color.

Violet Ink is made by dissolving some violet aniline in water to which some alcohol has been added; it takes very little aniline to make a large quantity of the ink.

Gold Ink.—Mosaic gold, two parts, gum arabic, one part, rubbed up to a proper condition.

Silver Ink.—Triturate in a mortar equal parts of silver foil and sulphate of potassa, until reduced to a fine powder, then wash the salt out, and mix the residue with a mucilage of equal parts of gum arabic water.

Fullam's Recipe for Indelible Stencil-plate Ink.—1 lb. precipitate carbonate of iron; 1 lb. sulphate of iron; 1¼ lbs. acetic acid. Stir over a fire until they combine; then add 3 lbs. printer's varnish and 2 lbs. fine book ink, and stir until well mixed. Add 1 lb. of Ethiop's mineral.

Exchequer Ink.—Bruised galls, 40 lb.; gum, 10 lb.; green sulphate of iron, 9 lb.; soft water, 45 gal. Macerate for 3 weeks with frequent agitation and strain. This ink will endure for ages.

Asiatic Ink.—Bruised galls, 14 lb.; gum, 5 lb. Put them in a small cask, and add of boiling soft water, 15 gal. Allow the whole to macerate, with frequent agitation, for two weeks, then further add green copperas, 5 lb., dissolved in 7 pt. water. Again mix well, and agitate the whole daily for two or three weeks.

Extra good Black Ink.—Bruised galls, 2 lb., logwood chips, green copperas and gum, of each, 1 lb.; water, 7 gal. Boil 2 hours and strain. Product, 5 gal.

Brown Ink.—A strong decoction of catechu. The shade may be varied by the cautious addition of a little wea ksolution of bichromate of potash.

Indelible Ink.—Nitrate of silver, ¼ oz.; water, ¾ oz. Dissolve, add as much of the strongest liquor of *ammonia* as will dissolve the precipitate formed on its first addition; then add of mucilage 1½ dr., and a little sap green, syrup of buckthorn, or finely powdered indigo, to color. Turns black on being held near the fire, or touched with a hot iron.

Indelible Ink for Glass or Metal.—Borax, 1 oz; shellac, 2 oz.; water, 18 *fluid* oz.; boil in a covered vessel, add of thick mucilage, 1 oz.; triturate it with levigated indigo and lampblack q. s., to give it a good color. After 2 hours' repose, decant from the dregs and bottle for use. It may be bronzed after being applied. Resists moisture, chlorine, and acids.

Common Ink—To 1 gal. boiling soft water, add ¾ oz. extract logwood; boil two minutes; remove from the fire, and stir in 48 grains bichromate of potash, and 8 grains prussiate of potash; for 10 gal. use 6½ oz. logwoode xtract; 1 oz. bichromate of potash, and 80 grains prussiate of potash; strain.

Black Copying Ink, or Writing fluid.—Take 2 gal. rain water and put into it gum arabic, ¼ lb.; brown sugar, ¼ lb.; clean copperas, ¼ lb.; powdered nutgalls, ¾ lb.; mix, and shake occasionally for ten days and strain; if needed sooner, let it stand in an iron kettle until the strength is obtained. This ink will stand the action of the atmosphere for centuries, if required.

Red Ink.—In an ounce phial put 1 teaspoonful of aqua-ammonia; gum arabic, size of two or three peas; and 6 grains of No. 40 ca[illegible]ine; fill up with soft water, and it is soon ready for use.

Liquid Blacking.—Ivory black, 2 lbs.; molasses, 2 lbs.; sweet oil, 1 lb.; rub *together till well* mixed; then add oil vitriol, ¼ lb.;

add coarse sugar, ½ lb.; and dilute with beer bottoms; this cannot be excelled.

Ticketing Ink for Grocers, &c.—Dissolve 1 oz. of gum arabic in 6 oz. water, and strain; this is the mucilage; for *black color*, use drop-black, powdered, and ground with the mucilage to extreme fineness; for *blue*, ultra-marine is used in the same manner; for *green*, emerald green; for *white*, flake white; for *red*, vermilion, lake, or carmine; for *yellow*, chrome yellow. When ground too thick, they are thinned with a little water. Apply to the cards with a small brush. The cords may be sized with a thin glue, and afterwards varnished, if it is desired to preserve them.

Bluing for Clothes.—Take 1 oz. of soft Prussian blue, powder it, and put in a bottle with 1 quart of clear rain water, and add ½ oz. of pulverized oxalic acid. A tablespoonful is sufficient for a large washing.

Premium Method of keeping Hams, &c.—To 4 gal. water, add 8 lbs. coarse salt; ¼ oz. potash; 2 oz. saltpetre; 2 lbs. brown sugar. Boil together, skim when cold, put on the above quantity to 100 lbs. meat; hams to remain in eight weeks, beef, three weeks. Let the hams dry several days before smoking. Meat of all kinds, salmon and other fish, lobsters, &c., may be preserved for years by a light application of pyroligneous acid applied with a brush, sealing up in cans as usual. It imparts a splendid flavor to the meat, is very cheap, and an effectual preservative against loss.

To preserve Meats, Salmon, Lobsters, &c., hermetically sealed.—The meat to be preserved is first parboiled or somewhat more, and freed from bones. It is then put into tin cases or canisters, which are quite filled up with a rich gravy. A tin cover, with a small aperture, is then carefully fixed on by solder; and, while the vessel is perfectly full, it is placed in boiling water, and undergoes the remainder of the cooking. The small hole in the cover is completely closed up by soldering while the whole is yet hot. The canister, with its ingredients, is now allowed to cool, in consequence of which these contract, and the sides of the vessel are slightly forced inward by atmospheric pressure, and become a little concave. The vessel being thus hermetically sealed, and all access of air prevented, it may be sent into any climate without fear of putrefaction; and the most delicate food of one country may be used in another in all its original perfection months and years after its preparation. Lobsters should be boiled longer than meats, and the scales removed previous to putting into the canisters. Salmon put up by this process is most delicious. By the French process, the meat is boiled till it is three-quarters done, when two-thirds of it are taken out, the remaining one-third is boiled into a concentrated soup, and the meat previously taken out is put into the canisters, which are then filled up with the soup; the tin cover with aperture is soldered on, and the canister with its contents submitted to a further boiling in hot water, when the aperture is closed, as above stated, and the canisters laid away in store.

To preserve Fruits without Sugar.—Fill some stone wide-mouthed bottles with the fruit carefully picked, and set them in a *copper or large* kettle; then fill the kettle with cold water nearly up to the mouths of the bottles. Corks should be prepared to fit the bottles, and a cloth should be put under the bottoms of the bottles to prevent their cracking with the heat. Light the fire under the kettle, and heat the water to 160° or 170°. This heat should be continued for half an hour, when the fruit will be sufficiently scalded ; after that, fill up the bottles with boiling water to within an inch of the cork, and cork them tightly. Lay the bottles on their sides ; change the position of the bottles once or twice a week during the first two months, turning them round to prevent any fermentation that might take place. Fruits could also be kept by the process mentioned above for meats, remembering that they are to be scalded only, not boiled, as is the case with meats.

Another Method.—After paring and coring, put amongst them sufficient sugar to make them palatable for present eating, about 3 or 4 lbs. only to each bushel ; let them stand awhile to dissolve the sugar, not using any water : then heat to a boil, and continue the boiling with care for 20 to 30 minutes, or sufficiently long to heat them through, which expels the air. Have ready a kettle of hot water, into which dip the can or bottle long enough to heat it ; then fill in the fruit while hot, corking it immediately, dipping the end of the cork into the bottle-wax preparation described elsewhere.

Worcestershire Sauce.—Port wine and mushroom ketchup, of each 1 qt. ; old ale and strong vinegar, of each, ½ pt. ; walnut pickle, 1 pt. ; soy, ½ pt. ; pounded anchovies, ½ lb. ; fresh lemon peel, minced shallots, and scraped horse-radish, of each, 2 oz. ; allspice and black pepper (bruised), of each, 1 oz. ; curry powder, ¾ oz. Digest 14 days ; strain and bottle.

Gherkins.—Take small cucumbers (not young), steep for a week in *very strong* brine ; it is then poured off, heated to the boiling point, and again poured on the fruit. The next day, the gherkins are drained on a sieve, wiped dry, put into bottles or jars, with some spice, ginger, pepper, or cayenne, and at once covered with strong pickling vinegar.

Mixed Pickles from cauliflowers, white cabbage, French beans, onions, cucumbers, &c., are treated as *gherkins*, with raw ginger, capsicum, mustard-seed, and long pepper, added to each bottle. A little coarsely-bruised turmeric improves both the color and flavor.

Indian Pickle.—*Piccalilli.*—Take one hard white cabbage (sliced), 2 cauliflowers, pulled to pieces, 20 French beans, 1 stick of horse-radish, sliced fine, 2 doz. small white onions, and 1 doz. gherkins. Cover these with boiling brine ; next day, drain the whole on a sieve, put it into a jar, add of curry powder, or turmeric, 2 oz. ; garlic, ginger, and mustard-seed, of each 1 oz. ; capsicum, ½ oz. Fill up the vessel with hot pickling vinegar ; bung it up close, and let it stand for a month, with occasional agitation every week.

To Preserve Fruit Juice without Heat.—Ingredients : 10 lbs. of fresh-gathered, picked, ripe red currants, or other fruit, 2 qts. cold-water, 5 oz. tartaric acid, 6 lbs. of coarse-sifted sugar. Put the fruit into a large earthen pan, pour the water with the tartaric acid *dissolved in it over the fruit*, cover the pan with some kind of lid, and allow the whole to steep for 24 hours in a *cold* place, and it would be all the better if the pan containing the fruit could be immersed in rough ice. Next, pour the steeped fruit into a suspended stout flannel bag, and when all the juice has run through, tie up the open end of the bag, and place it on a large earthen dish, with another dish upon it; place a half-hundred weight upon this, to press out all the remaining juice, and then mix it with the other juice. You now put the sifted sugar into the juice, and stir both together occasionally, until the sugar is dissolved, and then bottle up the syrup, cork, and tie down the bottles with wire, and keep them in the ice well or in a cold cellar, in a reclining position.

To RESTORE INJURED MEAT.—When the brine sours and taints the meat, pour it off; boil it, skim it well, then pour it back again on the meat boiling hot; this will restore it, even when much injured. If tainted meat is injured, dip it in the solution of chloride of lime prescribed for rancid butter; it will restore it. Fly-blown meat can be completely restored by immersing it for a few hours in a vessel containing a small quantity of beer; but it will taint and impart a putrid smell to the liquor. Fresh meat, hams, fish, &c., can be preserved for an indefinite length of time without salt, by a light application of pyroligneous acid applied with a brush; it imparts a fine smoky flavor to the meat, and is an effectual preservative. But pure acetic acid may be used instead.

METHOD OF CURING BAD TUB BUTTER.—A quantity of tub-butter was brought to market in the West Indies, which, on opening, was found to be very bad, and almost stinking. A native of Pennsylvania undertook to cure it, which he did in the following manner:—

He started the tubs of butter in a large quantity of hot water, which soon melted the butter; he then skimmed it off as clean as possible, and worked it over again in a churn, and, with the addition of salt and fine sugar, the butter was sweet.

To RESTORE RANCID BUTTER.—Use 1 pt. water to each lb. of butter, previously adding 20 grs. chloride of lime to each pt. of water; wash well the butter in this mixture, afterward re-wash in cold water and salt; or melt the butter in a water bath with animal charcoal, coarsely powdered and previously well sifted to free it from dust; skim, remove, and strain through flannel; then salt.

FRESH MEAT—TO KEEP A WEEK OR TWO IN SUMMER.—Farmers or others living at a distance from butchers can keep fresh meat very nicely for a week or two, by putting it into sour milk, or butter milk, placing it in a cool cellar. The bone or fat need not be removed. Rinse well when used.

MILKMAN'S PROCESS.—To give a body to diluted milk use the following nutritive and healthy compound at the rate of 8 oz. to every 5 gals., stirring it up in the milk, till all is dissolved: arrowroot, 6 oz.; magnesia, 6 oz.; starch, 1 lb., flour, ½ lb.; white sugar in powder, 1 lb.; mix all intimately together, and keep in a dry place for use.

CUSTARD POWDERS.—Sago meal and flour, 1 lb. each, color with turmeric to a cream color. Flavor with essential oil of almonds, 1 dr.; ess. of lemon, 2 drs. Use with sweetened milk to form *extemporaneous custards.*

Curry Powder.—Turmeric and coriander seeds, of each, 4 oz.; black pepper, 2½ oz.; ginger, 14 drs.; cinnamon, mace, and cloves, each, ½ oz.; cardamom seeds, 1 oz.; cummin seeds, 2 drs.; cayenne pepper, 1 oz.; powder and mix.

Napoleon's Camp Sauce.—Old strong beer, 2 qts., white wine, 1 qt., anchovies 4 ounces: mix; boil for ten minutes; remove it from the fire, and add of peeled shallots, 3 ounces; macerate for 14 days, and bottle.

Pickled Onions.—Choose small round onions, remove the skins, steep them in strong brine for a week in a stone vessel, pour it off, and heat till it boils; then pour on the onions, boiling hot; after 24 hours, drain on a sieve, then put them in bottles, fill up over them with strong spiced vinegar, boiling hot, cork down immediately, and wax over the cork. In a similar manner are pickled mushrooms, cauliflowers, samphires, peas, beans, green gooseberries, walnuts, red cabbages (without salt, with cold vinegar). Observe that the soft and more delicate articles do not require so long soaking in brine as the harder and coarser kinds, and may be often kept by simply pouring very strong pickling vinegar on them without the application of heat. *For peaches*, select ripe but not soft ones; rub with a dry cloth; put four cloves, free from their heads, in each large peach, and two in small ones; to one gallon vinegar, put 6 lb. good brown sugar; put the peaches in a jar, and put the vinegar (diluted with water, if too strong) and sugar in a preserving kettle over the fire; boil and skim it; pour it boiling hot over the peaches, covering them closely; repeat the operation three times; then seal them tightly in cans or bottles.

French Patent Mustard.—Flour of mustard, 8 lbs.; wheaten flour, 8 lbs.; bay salt, 2 lbs.; cayenne pepper, 4 oz.; vinegar to mix.

Common Mustard.—Flour of mustard, 28 lbs.; wheat flour, 28 lbs.; cayenne pepper, 12 oz., or as required; common salt, 10 lbs.; rape oil, 3 lbs.; turmeric to color; mix well, and pass through a fine sieve.

Starch Polish.—White wax, 1 oz.; spermaceti, 2 oz.; melt them together with a gentle heat. When you have prepared a sufficient amount of starch, in the usual way, for a dozen pieces, put into it a piece of the polish the size of a large pea; more or less, according to large or small washings. Or thick gum solution (made by pouring boiling water upon gum arabic), one tablespoon to a pint of starch, gives clothes a beautiful gloss.

Fire Kindlers.—To make very nice fire kindlers, take resin, any quantity, and melt it, putting in for each pound being used, from 2 to 3 oz. of tallow, and when all is hot, stir in pine sawdust to make very thick; and, while yet hot, spread it out about 1 inch thick, upon boards which have fine sawdust sprinkled upon them, to prevent it from sticking. When cold, break up into lumps about 1 inch square. But if for sale, take a thin board and press upon it, while yet warm, to lay it off into 1 inch squares: this makes it break regularly, if you press the crease sufficiently deep, greasing the marked board to prevent it from sticking.

To keep Cider sweet, and sweeten Sour Cider.—To keep cider perfect, take a keg and bore holes in the bottom of it; spread a piece of woollen cloth at the bottom; then fill with clean sand closely packed; draw your cider from a barrel just as fast as it will run through the sand; after this, put it in clean barrels which have had a piece of cotton or linen cloth 2 by 7 inches dipped in melted sulphur and burned inside of them, thereby absorbing the sulphur fumes (this process will also sweeten sour cider); then keep it in a cellar or room where there is no fire, and add ½ lb. white mustard seed to each barrel. If cider is long made, or souring when you get it, about 1 qt. of hickory ashes (or a little more of other hard wood ashes) stirred into each barrel will sweeten and clarify it nearly equal to rectifying it as above; but if it is not rectified, it must be racked off to get clear of the pomace, as with this in it, it will sour. Oil or whisky barrels are best to put cider in, or ½ pint sweet oil to a barrel, or a gallon of whisky to a barrel, or both, may be added, with decidedly good effects; isinglass, 4 oz. to each barrel, helps to clarify and settle cider that is not going to be rectified.

GINGER WINE.—Water, 10 gals., lump sugar, 20 lbs., bruised ginger, 8 oz.; 3 or 4 eggs. Boil well and skim; then pour hot on six or seven lemons cut in slices, macerate for 2 hours; then rack and ferment; next add spirit, 2 qts., and afterwards finings, 1 pint; rummage well. To make the color, boil ½ oz. saleratus and ½ oz. alum in 1 pint of water till you get a bright red color.

ICE CREAM.—Have rich, sweet cream, and a half-pound of loaf sugar to each quart of cream or milk. If you cannot get cream, the best imitation is to boil a soft custard, 6 eggs to each quart of milk (eggs well beat). Or another is made as follows: boil 1 quart of milk, and stir into it, while boiling, 1 tablespoonful of arrowroot wet with cold milk; when cool, stir into it the yolk of 1 egg to give it a rich color. Five minutes' boiling is enough for either plan. Put the sugar in after they cool; keep the same proportions for any amount desired. Or thus: to 6 quarts of milk add ½ lb. Oswego starch, first dissolved; put the starch in 1 quart of the milk; then mix altogether, and simmer a little (not boil); sweeten and flavor to your taste; excellent. The juice of strawberries or raspberries gives a beautiful color and flavor to ice creams, or about ½ ounce essence or extract to 1 gallon, or to suit the taste. Have your ice well broken, 1 qt. salt to a bucket of ice. About one half hour's constant stirring, with occasional scraping down and beating together, will freeze it.

SUBSTITUTE FOR CREAM.—Take 2 or 3 whole eggs, beat them well up in a basin; then pour boiling hot tea over them; pour gradually to prevent curdling. It is difficult for the taste to distinguish it from rich cream.

CHICAGO ICE CREAM.—Irish moss soaked in warm water one hour, and rinsed well to cleanse it of sand and a certain foreign taste; then steep it in milk, keeping it just at the point of boiling or simmering for one hour, or until a rich yellow color is given to the milk; without cream or eggs, from 1 to 1½ oz. to a gal. only is necessary, and this will do to steep twice. Sweeten and flavor like other creams.

GINGER BEER.—Take 5½ gals. water, ¾ lb. ginger root bruised, *tartaric acid, ½ oz.*, white sugar, 2½ lbs., whites of 3 eggs well *beaten, 10 small* teaspoonfuls of lemon ess.; yeast, 1 gill; boil the root for 30 minutes in 1 gal. of the water; strain off, and put the ess. in while hot; mix, make over night; in the morning, skim and bottle, keeping out the sediments.

Philadelphia Beer.—Take 30 gals. water, brown sugar, 20 lbs. ginger root bruised, ¼ lb., cream of tartar, 1¼ lbs., carbonate of soda, 3 oz., oil of lemon, cut in a little alcohol, 1 teaspoonful, the white of 10 eggs well beaten, hops, 2 oz., yeast, 1 qt. The ginger root and hops should be boiled for twenty or thirty minutes in enough of the water to make all milk-warm; then strained into the rest and the yeast added and allowed to work itself clear; then bottle.

Cider without Apples.—Water, 1 gallon; common sugar, 1 lb.; tartaric acid, ½ oz.; yeast, one tablespoonful; shake well, make in the evening, and it will be fit to use next day.

For Bottling.—Put in a barrel, 5 gals. hot water; 30 lbs. common sugar; ¾ lb. tartaric acid; 25 gallons cold water; 3 pints of hop or brewers' yeast, worked into paste with 1 pint water and 1 lb. flour. Let it work in the barrel forty-eight hours, the yeast running out of the bunghole all the time, putting in a little sweetened water occasionally to keep it full; then bottle, putting in two or three broken raisins to each bottle; and it will nearly equal champagne.

Cheap Cider.—Put in a cask 5 gals. hot water; 15 lbs. brown sugar; 1 gal. molasses; ½ gal. hop or brewers' yeast; good vinegar, 6 qts.; stir well, add 25 gals. cold water, ferment as the last.

Another Cider.—Cold water, 20 gals., brown sugar, 15 lbs., tartaric acid, ½ lb.; rummage well together, and add, if you have them, 3 or 4 lbs. of dried sour apples, or boil them and pour in the expressed juice. This cider will keep longer than the others.

Spruce and Ginger Beer.—Cold water, 10 gals.; boiling water, 11 gals.; mix in a barrel; add molasses, 30 lbs., or brown sugar, 24 lbs.; oil of spruce or any oil of which you wish the flavor, 1 oz.; add 1 pint yeast, ferment, bottle in two or three days. If you wish white spruce beer, use lump sugar; for ginger flavor, use 17 oz. ginger root bruised, and a few hops; boil for thirty minutes in three gals. of the water, strain and mix well; let it stand two hours and bottle, using yeast, of course, as before.

Hop Beer, very fine.—Mix 14 lbs molasses and 11 gals. water well together, and boil them for 2 hours with 6 oz. hops. When quite cool, add a cupful of yeast, and stir it well by a gallon or two at a time. Let it ferment for 16 hours, in a tub covered with a sack, then put it into a 9-gallon cask, and keep it filled up; bung it down in 2 days, and in 7 days it will be fit to drink, and will be stronger than London porter.

Edinburgh Ale.—Employ the best pale malt—1st, mash 2 barrels pr. quarter, at 183°, mash three-quarters of an hour, let it stand 1 hour, and allow half an hour to run off the wort; 2d, mash 1 barrel per quarter, at 180°, mash three-fourths of an hour, let it stand three-fourths, and tap as before; 3d, mash 1 barrel per quarter, at 170°, mash half an hour, let it stand half an hour, and tap as before. The first and second wort may be mixed together, boiling them about an hour or an hour and a quarter, with a quantity of hops proportioned to the time the ale is required to be kept. The first two may be mixed at the heat of 60°, in the gyletun, and the second should be fermented separately for small beer. The best hops should be used in the proportion of about 4 lbs. for every quarter of malt employed.

Bottling Porter.—Brown Stout. Pale malt, 2 quarters; amber and brown malt, of each 1½ do.; mash at 3 times, with 12, 7, and 6 barrels of water; boil with hops, 50 lbs., set with yeast, 29 lbs. Product, 17 barrels, or 1⅓ times the malt.

Lemon Beer.—To make 20 gals., boil 6 oz. of ginger root bruised, ¼ lb. cream of tartar, for 20 or 30 minutes, in 2 or 3 gals. water; this will be strained in 13 lbs. coffee sugar, on which you have put ⅛ oz. oil of lemon, and six good lemons squeezed up together, having warm water enough to make the whole 20 gals. just so hot that you can hold your hand in it without burning, or about 70 degrees of heat; put in 1½ pints of hop or brewers' yeast, worked into paste with 5 or 6 oz. flour. Let it work over night, then strain and bottle for use.

Table Beer.—Malt, 8 bushels, hops, 7 lbs., molasses, 25 lbs.; brew for 10 barrels; smaller quantity in proportion.

Hop Beer.—Hops, 6 ounces, molasses, 5 quarts; boil the hops till the strength is out, strain them into a 30-gallon barrel; add the molasses and 1 teacupful of yeast, and fill up with water; shake it well, and leave the bung out till fermented, which will be in about 24 hours. Bung up, and it will be fit for use in about three days.

Molasses Beer.—Hops, 1 oz.; water, 1 gal.; boil for 10 minutes, strain, add molasses, 1 lb., and when luke-warm, yeast, 1 spoonful. Ferment.

Root Beer.—For 10 gallons beer, take 3 lbs. common burdock root, or 1 oz. essence of sassafras; ½ lb. good hops; 1 pint corn, roasted brown. Boil the whole in 6 gallons pure water until the strength of the materials is obtained; strain while hot into a keg, adding enough cold water to make 10 gallons. When nearly cold add clean molasses or syrup until palatable,—not sickishly sweet. Add also as much fresh yeast as will raise a batch of eight loaves of bread. Place the keg in a cellar or other cool place, and in forty-eight hours you will have a keg of first-rate sparkling root beer.

Cheap Beer.—Water, 15 gals.; boil half the water with ¼ lb. hops; then add to the other half in the tun, and mix well with 1 gal. molasses and a little yeast.

To restore Sour Beer.—Good hops, ¼ lb., powdered chalk, 2 lbs. Put in the hole of the cask, and bung close for a few days; for frosted beer, add some finings, a few handfuls of flour, and some scalded hops; for ropy beer, use a handful or two of flour, the same of hops, with a little powdered alum to each barrel. Rummage well.

To improve the Flavor of Beer.—Bruised ginger, 1 oz.; bruised cloves, ½ oz.; a few scalded hops and a doz. broken coarse biscuits to every two barrels. Rummage well.

Lemonade.—White sugar, 1 lb., tartaric acid, ¼ ounce, essence of lemon, 30 drops, water 3 qts. Mix.

Cream Soda.—Loaf sugar, ten lbs., water, 3 gal.; warm gradually so as not to burn; good rich cream, 2 quarts, extract vanilla, 1½ ounces, extract nutmeg, ½ ounce, tartaric acid, 4 ounces. Just g to a boiling heat; for if you cook it any length of time, it crystallize; use 4 or 5 spoonfuls of this syrup instead iree, as in other syrups; put ¼ teaspoonful of soda to a a, if used without a fountain. For charged fountains no acid ed.

EEZING PREPARATION.—Common sal-ammoniac, well pulver- 1 part; saltpetre, 2 parts; mix well together. Then take com- soda, well pulverized. To use, take equal quantities of these arations (which must be kept separate and well covered pre- s to using) and put them in the freezing pot; add of water a er quantity, and put in the article to be frozen in a proper el; cover up, and your wants will soon be supplied. For freez- cream or wines this cannot be beat.

ORTABLE LEMONADE.—Tartaric acid, 1 ounce, white sugar, 2 lbs., nce of lemon, quarter ounce; powder and keep dry for use. dessert spoonful will make a glass of lemonade.

IPERIAL CREAM NECTAR.—Part 1st, take 1 gallon water, loaf ar, 6 lbs., tartaric acid, 6 ounces, gum arabic, 1 ounce. Part 2d, :, 4 teaspoonfuls, the whites of 5 eggs; beat finely together; add ½ pint water; when the first part is blood warm, put in second; boil 3 minutes, and it is done. Directions: 3 table- nfuls of syrup to two-thirds of a glass of water; add one- 1 teaspoonful of carbonate of soda, made fine; stir well, and k at your leisure.

EPPERMINT CORDIAL.—Good whisky, 10 galls., water, 10 galls., te sugar, 10 lbs., oil peppermint, 1 ounce, in 1 pint alcohol, 1 lb. r well worked in the fluid, ½ lb. burned sugar to color. Mix, let it stand one week before using. Other oil in place of pep- nint, and you have any flavor desired.

LVER-TOP DRINK.—Water, 3 qts., white sugar, 4 lbs., ess. of lemon, aspoonfuls, white of 5 eggs, beat with 1 tablespoonful of flour; to form a syrup; then divide into equal parts, and to one add nces tartaric acid, to the other 4 ounces of carbonate of soda; in a teaspoonful of each of the syrups, more or less (according he size of the glass), to two-thirds of a glass of water; drink :k.

ANGAREE.—Wine, ale, or porter, or two-thirds water, hot or cold cording to the season of the year, loaf sugar to taste, with nut- .

ROUGHTON BITTERS.—Gentian, 4 ounces, orange peel, 4 ounces, umbo, 4 ounces, camomile flowers, 4 ounces, quassia, 4 ounces, ned sugar, 1 lb., whisky, 2½ galls. Mix and let it stand 1 week. tle the clear liquor.

ODA SYRUPS.—Loaf or crushed sugar, 8 lbs., pure water, 1 gallon, a arabic, 2 oz.; mix in a brass or copper kettle. Boil until the a is dissolved, then skim and strain through white flannel, after ch add tartaric acid, 5½ oz.; dissolve in hot water; to flavor, use act of lemon, orange, vanilla, rose, sarsaparilla, strawberry, &c., ½ oz. or to your taste. If you use juice of lemon, add 2½ of sugar to a pint, you do not need any tartaric acid with it; use two tablespoonfuls of syrup to ¾ of a tumbler of water, ¼ teaspoonful of super-carbonate of soda, made fine; drink :k. For soda *fountains*, 1 oz. of super-carbonate of soda is used to 1 gallon of water. For charged fountains no acids are needed in the syrups.

Common Small Beer.—A handful of hops to a pail of water, a pint of bran and half a pint of molasses, a cup of yeast and a spoonful of ginger.

Royal Pop.—Cream tartar, 1 lb., ginger, 1½ oz., white sugar, 7 lbs., essence of lemon, 1 drachm, water, 6 galls., yeast, ½ pint. Tie the corks down.

Raspberry Syrup without Raspberries.—First make a syrup with 36 lbs. of white sugar, and 10 gallons of water, and put it into a clean mixing barrel. Then dissolve ¼ lb. of tartaric acid in 1 qt. of *cold* water, and add to the syrup. Next take ½ lb. orris root, and pour over it half a gallon of *boiling* water; let it infuse until cold, then filter, and put it into the mixing barrel, stirring it well.

To Color.—Boil ½ oz. of cochineal; ¾ oz. cream tartar; ½ oz. saleratus, and ½ oz. alum in 1 qt. of water till you get a bright red color, and add this to the syrup till the color suits. The above is a very valuable receipt, and will make 16 gals. syrup at a very low cost per gallon. If it is desirable to produce a richer syrup, add more sugar. Colors ought to be made in a brass or copper kettle.

Bottled Soda Water without a Machine.—In each gallon of water to be used, carefully dissolve ½ lb. of crushed sugar, and one ounce of super-carbonate of soda; then fill pint bottles with this water, have your corks ready; now drop into each bottle ½ dram of pulverized citric acid, and immediately cork and tie down. Handle the bottles carefully, and keep cool until needed. More sugar may be added if desired.

Oyster Soup.—To each dozen or dish of oysters put ½ pint of water; milk, 1 gill; butter ½ oz.; powdered crackers to thicken; bring the oysters and water to a boil, then add the other ingredients previously mixed together, and boil from three to five minutes only. Season with pepper and salt to taste.

Mock Terrapin.—*A supper dish.* Half a calf's liver; seasoned, fry brown. Hash it, not very fine, dust thickly with flour, a teaspoon mixed mustard, as much cayenne pepper as will lie on a half dime; 2 hard eggs, chopped fine, a lump of butter as large as an egg, a tea cup of water. Let it boil a minute or two; cold veal will do, if liver is not liked.

Mutton Harricot.—Take a loin of mutton, cut it into small chops, season it with ground pepper, allspice and salt, let it stand a night, and then fry it. Have good gravy well seasoned with flour, butter, catsup and pepper, if necessary. Boil turnips and carrots, cut them small, and add to the mutton stewed in the gravy, with the yolks of hard boiled eggs and force meat balls.

Imitation Apple Butter.—Vinegar, 1 qt.; cheap molasses, 1 qt.; mix together, set over the fire till it commences to cook; take it off, add 10 tablespoonfuls of wheat flour, and cold water to make a batter, then add 1 qt. scalding water, stir and cook for 15 minutes.

Blackberry Wine.—Wash the berries, and pour 1 qt. of boiling water to each gal. Let the mixture stand 24 hours, stirring occasionally; then strain and measure into a keg, adding 2 lbs. sugar, and good rye whisky 1 pint, or best alcohol, ½ pint to each gal. *Cork tight,* and put away for use. The best wine that can be made.

Lemon Syrup.—Havana sugar, 1 lb., boil in water down to a quart, drop in the white of 1 egg, and strain it. Add ¼ oz. tartaric acid; let it stand 2 days; shake often; 12 drops essence of lemon will much improve it.

Superior Raisin Wine.—Take 30 lbs. of chopped raisins free from stems and dust; put them in a large keg, and add to them 10 gals. soft water; let them stand two weeks unbunged, shaking occasionally (warm place in winter), then strain through woollen, or filter; color with burnt sugar; bottle and cork well for use. The more raisins the better the wine, not exceeding 5 lbs. to each gallon.

Raisin Wine equal to Sherry.—Boil the proper quantity of water and let it stand till cold. To each gal. of this water add 4 lbs. of chopped raisins, previously well washed, and freed from stalks; let the whole stand for 1 month, stirring frequently; then remove the raisins, and bung up closely for 1 month more; then rack into another vessel, leaving all sediment behind, which must be repeated till it becomes fine; then to every 10 gals. add 6 lbs. of fine sugar, and 1 doz. of good oranges, the rinds being pared very thin, and infused in 2 qts. of brandy, which should be added to the liquor at its last racking. Let the whole stand three months in the cask, then bottle. It should remain bottled twelve months. To give it the flavor of Madeira, when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

Port Wine.—Worked cider, 42 gals.; good port wine, 12 gals.; good brandy, 3 gals.; pure spirits, 6 gals; mix. Elderberries and sloes, and the fruit of the black haws, make a fine purple color for wines, or use burnt sugar.

American Champagne.—Good cider (crab-apple cider is the best), 7 gals.; best fourth-proof brandy, 1 qt.; genuine champagne wine, 5 qts.; milk, 1 gal.; bitartrate of potassa, 2 oz. Mix, and let stand a short time; bottle while fermenting. An excellent imitation.

British Champagne.—Loaf-sugar, 56 lbs.; brown sugar (pale), 48 lbs.; water (warm), 45 gals.; white tartar, 4 oz.; mix, and at a proper temperature add yeast, 1 qt.; afterwards sweet cider, 5 gals.; bruised wild cherries, 14 or 15 oz.; pale spirits, 1 gal.; orris-powder, ½ oz. Bottle while fermenting.

British Madeira.—Pale malt. 1 bushel; boiling water, 12 gals.; mash and strain; then add white sugar, 4 lbs.; yeast, 1 lb. Ferment, next add raisin or Cape wine, 3 qts.; brandy, 3 qts.; sherry, 2 qts.; port, 2 qts.; bung down. The malt may be mashed again for bottle beer.

Currant and other Fruit Wines.—To every gallon of expressed juice, add 2 gals. soft water, 6 lbs. brown sugar, cream tartar, 1½ oz.; and qt. brandy to every 6 gals.; some prefer it without brandy. After fermentation, take 4 oz. isinglass dissolved in 1 pt. of the wine, and put to each barrel, which will fine and clear it; when it must be drawn into clean casks, or bottled, which is preferable.

Blackberry and Strawberry Wines are made by taking the above wine when made with port wine, and for every 10 gals.

from 4 to 6 qts. of the fresh fruit, bruised and strained, are added, and let stand four days till the flavor is extracted; when bottling, add 3 or four broken raisins to each bottle.

Morella Wine.—To each quart of the expressed juice of the morella, or tame cherries, add 3 qts. water, and 4 lbs. of coarse brown sugar; let them ferment, and skim till worked clear; then draw off, avoiding the sediment at the bottom. Bung up, or bottle, which is best for all wines, letting the bottles lie always on the side, either for wines or beers.

London Sherry.—Chopped raisins, 400 lbs.; soft water, 100 gals.; sugar, 45 lbs.; white tartar, 1 lb.; cider, 16 gals. Let them stand together in a close vessel one month; stir frequently. Then add of spirits, 8 gals.; wild cherries bruised, 8 lbs. Let them stand one month longer, and fine with isinglass.

English Patent Wine from Rhubarb.—To each gal. of juice, add 1 gal. soft water, in which 7 lbs. brown sugar have been dissolved; fill a keg or barrel with this proportion, leaving the bung out, and keep it filled with sweetened water as it works off, until clear. Any other vegetable extract may be used if this is not liked: then bung down or bottle as you please. The stalks will yield ¾ their weight in juice; fine and settle with isinglass as above. This wine will not lead to intemperance.

Various Wines.—To 28 gals. clarified cider add good brandy, 1 gal.; crude tartar (this is what is deposited by grape wines), milk to settle it, 1 pt.; draw off 36 hours after thoroughly mixing.

Ginger Wine.—Put one oz. of good ginger-root bruised in 1 qt. 95 per. cent. alcohol; let it stand nine days, and strain; add 4 qts. water, and 1 lb. white sugar dissolved in hot water, color with tincture of sanders to suit. For bar-purposes add 1 pt. port wine.

Another.—To 1 qt. 95 per cent. alcohol add 1 oz. best ginger-root (bruised but not ground), 5 grs. capsicum, and 1 dr. tartaric-acid. Let it stand one week and filter; now add 1 gal. water in which 1 lb. of crushed sugar has been boiled. Mix when cold. To make the color, boil ½ oz. cochineal, ¾ oz. cream tartar, ½ oz. saleratus, and ½ oz. alum, in one pt. of water till you get a bright-red color.

To restore Flat Wine.—Add 4 or 5 gals. of sugar, honey, or bruised raisins to every 100 gals., and bung close; a little spirit may be added, to roughen; take bruised sloes, or powdered catechu, and add to the wine in suitable proportions, or add a small quantity of bruised berries of the mountain ash, to allay inordinate flatness. Let it stand 2 hours and bottle, using yeast, of course, as before.

White Wines are generally fined by isinglass in the proportion of 1½ oz. (dissolved in 1½ pts. of water, and thinned with some of the wine) to the hogshead. *Red Wines* are generally fined with the whites of eggs, in the proportion of 12 to 18 to each pipe; they must be well beaten to a froth with about 1 pt. of water, and afterwards mixed with a little of the wine, before adding them to the liquor. Rummage well.

Champagne Cider.—Good pale cider, 1 hhd.; spirit, 3 gals.; sugar, 20 lbs.; mix, and let it stand one fortnight; then fine with skimmed *milk, ½ gal.; this will* be very pale, and a similar article, when properly bottled and labelled, opens so brisk, that even good judges have mistaken it for genuine champagne.

Berlin Carraway Cordial.—Take 8 gals. spirit, 50 per cent.; 1 oz. oil of carraway, which you dissolve in spirit 95 per cent.; 8 lbs. sugar; 8 lbs. water. Dissolve your sugar in the water; mix, stir and filter.

Stomach Bitters Equal to Hostetters'.—European gentian root, 1½ oz.; orange peel, 2½ oz.; cinnamon, ¼ oz.; anise seed, ½ oz.; coriander seed, ½ oz.; cardamom seed, ⅛ oz.; unground Peruvian bark, ½ oz.; gum kino, ¼ oz.; bruise all these articles, and put them into the best alcohol, 1 pt.; let it stand a week, and pour off the clear tincture; then boil the dregs a few minutes in 1 qt. of water, strain, and press out all the strength; now dissolve loaf sugar, 1 lb., in the hot liquid, adding 3 qts. cold water, and mix with the spirit tincture first poured off, or you can add these, and let it stand on the dregs if preferred.

Boker's Bitters.—Rasped quassia, 1½ oz.; calamus, 1½ oz.; powdered catechu, 1½ oz.; cardamom, 1 oz.; dried orange peel, 2 oz.; macerate the above ten days in ½ gal. strong whisky, and then filter, and add 2 gals. water; color with mallow or malva flowers.

Curacoa Cordial, 40 Gals.—Essence of bitter oranges, 2 oz.; ess. o neroli, 2 oz.; ess. of cinnamon, ¼ oz.; 3 drs. mace, infused in alcohol. Dissolve the above essences in 1 gal. alcohol, 95 per cent.; then put in a clean barrel 13 gals. alcohol, 85 per cent.; 26 gals. sugar syrup, 30 degrees Baumé; and add 1 gal. perfumed spirit as above. Color with saffron or turmeric.

Curacoa d'Hollande, 20 Gals.—Curacoa orange-peel, 2 lbs; ½ lb. Ceylon cinnamon. Let them soak in water; boil them for five minutes with the juice of 32 oranges and 14 gals. of plain white syrup; then add 6 gals. alcohol, 95 per cent.; strain, filter; color dark yellow with sugar coloring.

Anisette Cordial, 40 Gals.—Put in a barrel 13 gals. alcohol, 75 per cent. Dissolve 3½ oz. essence of green anise-seed in 1 gal. 95 per cent. alcohol, and add ½ gal. orange-flower water; 8 or ten drops infusion of mace, and 5 drops essence of cinnamon. Then put in the barrel 26 gals. sugar syrup, 25 degrees Baumé; stir fifteen minutes, and let it rest four or five days; then filter. Add 2 or 3 sheets of filtering paper.

Ratafia.—Ratafia may be made with the juice of any fruit. Take 3 gals. cherry-juice, and 4 lbs. sugar, which you dissolve in the juice; steep in 2½ gals. brandy ten days; 2 drs. cinnamon, 24 cloves; 16 oz. peach-leaves; 8 oz. bruised cherry kernels. Filter, mix both liquids, and filter again.

Arrack Punch Syrup.—53½ lbs. sugar; 3½ gals. water. Boil up well; then add 1¾ gals. lemon-juice to the boiling sugar, and stir till the liquid is clear; pour it in a clean tub, and when nearly cool, add 5 gals. Batavia arrack, then filter.

Simple Syrup.—To 8 lbs. best white sugar add 2 qts. water, and the whites of 2 eggs; stir until all the sugar is dissolved; simmer for two or three minutes: skim well, and strain through a fine flannel bag.

Sarsaparilla Syrup.—To simple syrup add 10 drops oil of anise, 20 drops oil of wintergreen, 20 drops oil of sassafras, and 6 oz. of caramel or *coloring* to the gallon. Before the oils are added to the syrup, they should be cut by grinding them in a mortar with as much sugar as they will moisten, or mix with a small quantity of alcohol.

VANILLA SYRUP.—To simple syrup, add ½ oz. of ext. of vanilla to the gallon.

GINGER SYRUP.—Bruised Jamaica ginger, 1 oz.; boiling water, 1 pt.; macerate for four hours; add fine white sugar, 2 lbs.; and strain through a fine flannel bag. Ginger syrup may also be made by adding 2 oz. of the ext. of ginger to 1 gal. of simple syrup.

STRAWBERRY SYRUP WITHOUT STRAWBERRIES.—Add to 1 gal. simple syrup 2 teaspoons of essence of strawberry, and ¼ oz. tartaric acid; color with coloring made as follows: boil 1 oz. of cochineal with half a teaspoonful of cream tartar.

STRAWBERRY SYRUP.—Inclose fresh strawberries in a coarse bag, press out the juice, and to each qt. add 1 pt. water and 6 lbs. white sugar; dissolve by raising it to the boiling point, and strain; bottle and cork hot, and keep in a cool place.

BLACKBERRY SYRUP is made as directed for strawberry, adding to each qt. 1 oz. best French brandy.

WILD CHERRY SYRUP.—Steep 4 oz. wild cherry bark, well bruised in 1 pt. of cold water, for thirty-six hours; press out the infusion; let it stand till clear, decant and add 1½ lbs. fine white sugar; mix and strain.

NECTAR SYRUP.—Add to orgeat syrup 1 pt. of best port wine, and ½ oz. extract of vanilla to the gal.; or flavor 1 gal. simple syrup with 1 teaspoonful ext. of nectar.

ORGEAT SYRUP.—Take 3 oz. of sweet almonds, and ½ oz. bitter almonds; gum arabic, in powder, ½ oz.; sugar in powder, 3 oz.; rub together in a mortar, adding water from time to time until the mixture measures 1 qt. Strain through a cloth, and mix with 1 gal. of simple syrup.

ORANGE FLOWER SYRUP.—Add to 1 gal. of simple syrup, ½ oz. ext. of orange flowers.

ORANGE SYRUP.—Grate off the outside yellow peel of fresh and ripe oranges; cut them and express the juice: to each qt. add 1 pt. water and 6 lbs. sugar, previously well mixed with the grated peel. Dissolve by gentle heat, then strain.

PINE APPLE SYRUP.—Pare and mash the fruit in a marble or porcelain mortar, with a small quantity of sugar; express the juice, and, for each qt. take 1½ pts. of water and 6 lbs. fine sugar; boil the sugar and water; then add the juice; remove from the fire; skim and strain. Or make it with the essence directed for strawberry.

PEAR SYRUP.—Make as directed for pine apple syrup; or use the essence of pear, by adding to each gallon of simple syrup, 2 teaspoonfuls of essence of pear, and ¼ oz. tartaric acid.

BANANA SYRUP.—Make as directed for pine apple syrup, or with the appropriate essence and acid as above.

APPLE SYRUP.—Make as directed for pine apple syrup, or with the appropriate fruit and essences as above.

CREAM SYRUP.—Fresh cream, 1 pt.; fresh milk, 1 pt.; fine powdered sugar, 3 lbs.; beat the sugar with the milk, and the whites of 2 eggs; then mix with the cream. Flavor with lemon, vanilla, or *strawberry*. Keep in a cool place, well bottled.

Butyric Ether is much used to impart a pine apple flavor to rum. Dissolved in 8 or 10 parts of alcohol, it forms the pine apple essence. From 20 to 25 drops of this essence, added to 1 lb. sugar, containing a little citric acid, imparts to the mixture a strong taste of pine apple.

Amylo-Acetic Ether is a preparation of fruit-oil and other ingredients, and, when diluted with alcohol, it is sold as *essence of Jargonelle pear*, and is used for flavoring different liquors. Fifteen parts amylo-acetic ether, with half a part of acetic ether, dissolved in 100 parts of alcohol, form what may be called the *Bergamot-pear essence*, which, when employed to flavor sugar, acidulated with a little citric acid, imparts the odor of the Bergamot pear, and a fruity, refreshing taste.

Pelargonate or Ethylic Ether (pelargonic ether) has the agreeable odor of the quince, and, when dissolved in alcohol in due proportion, forms the *quince essence.*

Acetate of Amylic Ether (same as amylo ether), mixed with *butyric ether*, forms in alcoholic solution the *banana essence.*

Valerianate of Amylic Ether.—An alcoholic solution of this ether in the proportion of 1 part to 6 or 8 of alcohol, forms a flavoring liquid under the name of *apple essence.*

Milk Punch.—One tablespoonful of fine white sugar, 2 ditto of water, I wine glass of Cognac brandy, ½ ditto Santa Cruz rum, ⅓ tumblerful of shaved ice; fill with milk. Shake the ingredients well together, and grate a little nutmeg on top. To make it hot, use *hot* milk and no ice.

Glasgow Punch.—Melt lump-sugar in cold water, with the juice of a couple of lemons, passed through a fine wire strainer; this is sherbet, and most be will mingled. Then add old Jamaica rum, one part of rum to five of sherbet. Cut a couple of lemons in two, and run each section rapidly around the edge of the jug or bowl, gently squeezing in some of the delicate acid, when all is ready.

Mint Julep.—One tablespoonful of white pulverized sugar, 2½ ditto water; mix well with a spoon. Take 3 or 4 sprigs of fresh mint, press them well in the sugar and water, add 1½ wine glasses of Cognac brandy, and fill the glass with shaved ice, then draw out the sprigs of mint, and insert them in the ice with the stems downwards, so that the leaves will be above in the shape of a bouquet; arrange berries and small pieces of sliced orange on top in a tasty manner, dash with Jamaica rum, and sprinkle sugar on top. Sip with a glass tube or straw.

Cider Nectar.—One qt. cider, 1 bottle soda water, I glass sherry, 1 small glass brandy, juice of half a lemon, peel of ¼ of a lemon, sugar and nutmeg to taste. Flavor it with extract of pine apple, strain, and ice it all well.

Half and Half.—In London, this drink is made by mixing half porter and half ale; in America, it is made by mixing half new and half old ale.

Apple Toddy.—One tablespoonful of fine white sugar, 1 wineglass of cider brandy, ½ of a baked apple. Fill the glass two-thirds full of boiling water, and grate a little nutmeg on top.

Apple Punch.—*Lay in a* china bowl slices of apples and lemons *alternately, each layer being* thickly strewed with powdered sugar.

Pour over the fruit, when the bowl is half filled, a bottle of claret; cover, and let it stand for 6 hours. Then pour it through a muslin bag, and it is all ready.

Old Man's Milk.—One wine-glass of port wine, 1 teaspoonful of sugar. Fill the tumbler one third full of hot milk.

Perfect Love.—One tablespoonful sugar, 1 piece each of orange and lemon peel. Fill the tumbler one-third full of shaved ice, and fill balance with wine; ornament in a tasty manner with berries in season; sip through a straw.

Molasses Candy.—West-Indian molasses, 1 gallon; brown sugar, 2 lbs.; boil the molasses and sugar in a preserving kettle over a slow fire; when done enough it will cease boiling; stir frequently, and, when nearly done, stir in the juice of four lemons, or two teaspoonfuls of essence of lemon; afterwards butter a pan, and pour out.

Confectioners' Colors.—*Red*, cochineal, 1 oz.; boil 5 minutes in half pint water; then add cream tartar, 1 oz.; pounded alum, ½ oz.; boil 10 minutes longer, add sugar, 2 oz.; and bottle for use. *Blue*, put a little warm water on a plate, and rub in indigo till the required color is got. *Yellow*, rub with some water a little yellow gamboge on a plate, or infuse the heart of a yellow-lily flower with milk-warm water. *Green*, boil the leaves of spinach about 1 minute in a little water, and, when strained, bottle for use.

To Candy Sugar.—Dissolve 2 parts of double refined sugar in 1 of water. Great care must be taken that the syrup does not boil over, and that the sugar is not burnt. The first degree is called the thread, which is subdivided into the little and great thread; if you dip your finger in the syrup, and apply it to the thumb, the tenacity of the syrup will, on separating the finger and thumb, afford a thread which shortly breaks, this is the little thread; if the thread admits of a greater extension of finger and thumb, it is called the great thread; by longer boiling you obtain the pearl, which admits of being drawn without breaking by the utmost extension of finger and thumb; this makes candied sugar: by further boiling you obtain the *blue*, which is known by dipping a skimmer with holes in the syrup, and blowing through them; if bubbles are perceived, you have got the blow. The *feather* implies more numerous bubbles, and then the sugar will fly off like flakes while the skimmer is being tossed. By boiling longer, you obtain the *crack;* it will crack when broken, and does not stick to the teeth; dip a teaspoon into the sugar, and let it drop to the bottom of a pan of cold water. If the sugar remains hard, it has attained the degree termed *crack*.

Fig Candy.—Take 1 lb. of sugar and 1 pint of water; set over a slow fire. When done, add a few drops of vinegar and a lump of butter, and pour into pans in which split figs are laid.

Raisin Candy can be made in the same manner, substituting stoned raisins for the figs. Common molasses candy is very nice with all kinds of nuts added.

Scotch Butter Candy.—Take 1 lb. of sugar and 1 pint of water; dissolve, and boil. When done, add one tablespoonful of butter, and enough lemon juice and oil of lemon to flavor.

Common Lemon Candy.—Take 3 lbs. of coarse brown sugar; add to it three teacupfuls of water, and set over a slow fire for half an hour; put to it a little gum arabic dissolved in hot water; this is to clear it. Continue to take off the scum as long as any rises. When perfectly clear, try it by dipping a pipe-stem first into it and then into cold water, or by taking a spoonful of it into a saucer; if done, it will snap like glass. Flavor with essence of lemon and cut it into sticks.

Peppermint, Rose, or Hoarhound Candy.—They may be made as lemon candy. Flavor with essence of rose or peppermint or finely powdered hoarhound. Pour it out in a buttered paper, placed in a square tin pan.

Popped Corn, dipped in boiling molasses, and stuck together, forms an excellent candy.

Rock Candy.—To make fine rock candy, clarify double refined white sugar, filter it, and boil it till it is ready to crystallize, or boiled to a blister. The boiling sugar must measure 35° on the syrup weight, a degree more or less prevents its crystallization. Then take a brass kettle, of about 16 or 18 inches diameter and from 6 to 8 inches deep, smooth and polished on the inside. Make 8 or 10 small holes at equal distances from each other in a circle around the sides of the kettle, about 2 inches from the bottom; pass threads through these from one side to the other, and stop the holes on the outside with paste or paper to prevent the syrup from running out. Having thus prepared the kettle, pour in the syrup, till it rises about an inch above the threads; then place it in a stove moderately heated, and leave it to crystallize, agitating it from time to time. The crystallization will take place in six or seven days. As soon as the crystals are formed, pour off the remaining syrup, and throw in a little water to wash the crystals that are left at the bottom of the vessel. So soon as the mass is thoroughly drained set it in a very hot stove, leave it for two days, when it is fit for use. *Straw-coloured* rock candy is made by substituting brown for loaf sugar. The syrup must be boiled over a very hot fire in order to render the candy perfectly white. The sides of the kettle should be sponged repeatedly during the boiling process, to prevent the sugar from adhering and burning.

Orange Rock Candy is made by flavoring the syrup with a couple of teaspoonfuls of orange flower water, and coloring with saffron, just as the syrup is about to be taken from the fire. *Rose Rock Candy* it flavored with rose water, and colored with clarified carmine lake. *Vanilla Rock Candy* is perfumed with vanilla, and colored with liquid violet. The degree of coloring may be tested by dropping a little of the colored syrup on a sheet of white paper.

Ginger Candy.—Dissolve 1 lb. double-refined sugar in ½ pint of spring water; set it over a clear fire, and let it boil to a thin syrup. Have ready a teaspoonful of powdered ginger, mix it smoothly with 2 or 3 spoonfuls of the syrup, then stir it gradually into the whole. Boil the mixture into a *flake*, watching it carefully, that it may not exceed this point; then add the freshly grated rind of a large lemon, and stir the sugar constantly and rapidly until it fall in a mass from the spoon, without sinking when dropped upon a plate. If boiled for a moment beyond this point, it will *fall into a powder*. Should this happen by mistake, add a little water, and boil to the proper consistency. Dip the candy from the kettle, and drop it in small cakes upon buttered pans, then set it away to cool.

Cream Candy.—To 3 lbs. loaf sugar add ½ pt. water, and set it over a slow fire for half an hour; then add a teaspoonful of gum arabic dissolved, and a tablespoonful of vinegar. Boil it till it is brittle, then take it off, and flavor with vanilla, rose, or orange. Rub the hands with sweet butter, and pull the candy till it is white; then twist or break it, or stretch it out into thin white strips, and cut it off.

Red Verdun Sugared Almonds.—Dry the almonds in a stove by a slow fire. When dry enough to snap between the teeth, put them into a swinging basin and gum them by throwing over them a little gum arabic solution, cold; swing them constantly till dry; then give them another coating of gum arabic mixed with 4 oz. sugar, and swing them again till dry, using no fire. When they are thoroughly dry, set them over a moderate fire. Dissolve some sugar in orange or rose water, not too thin, set it over the fire 2 or 3 minutes, strain it through a sieve, and pour it over the almonds in the basin. Swing them till they are thoroughly coated and dried; then add another coating, composed of 2 parts of carmine, one part of gum, and one part of sugar, and proceed as before. If the almonds are not perfectly covered, give them a coating in which there is considerable gum; and when thoroughly moistened, throw on them some sifted sugar, stir till the mixture is all absorbed, then add successive coatings of sugar till they are large enough, and put them into the stove to remain till the next day, when in order to *whiten* them, you will proceed to boil 6 or 7 lbs. of fine clarified sugar to a blister, add 1 lb. of starch after taking it from the fire, stirring it constantly till a paste is formed a little thicker than that used for pastilles; a few drops of blue lake may be added to produce a pearl white. Put the almonds, warm, into the swinging basin, add enough of the prepared sugar to coat them, swing the basin till they are nearly dry, then set on the fire to finish the drying, then take the basin off the fire, heap them up in the middle, so as to allow the bottom of the vessel to cool; then add the coating of sugar, swing and dry them as before, and continue the process until 4 successive coatings of equal thickness have been given; then heat them well in the basin, put them into pans, and set them in the stove to remain over night. You will then proceed to *polish* them by giving them a coat of the prepared sugar and starch, and shake them violently until they are quite dry; give them another coating and proceed as before, and continue the process until they have received 4 successive coatings, when they will generally be found sufficiently polished. When the polishing is finished, put the almonds over a fire and stir gently till all are thoroughly heated, then place in a stove till the next day in a wicker basket lined with paper.

Spanish Sugared Almonds.—Make verdun sugared almonds about the size of pigeon's eggs, whiten and polish them by the previous directions, and paint different designs on them when completed.

Superfine Vanilla Sugared Almonds.—Proceed in the same manner as in the manufacture of verdun sugared almonds, make the solution of sugar in pure water; crush the essence of vanilla with a little sugar, and put in the solution.

Common Sugared Almonds.—Common almonds, 20 lbs., sugar 8 lbs., farina, 20 lbs., starch, 2 lbs. Heat the almonds in the swinging basin, when they boil, make them into a pulp with diluted starch; give first a warm then a cold coating, cover them with farina, shaking the basin violently; then, when the almonds have been coated to the requisite size, spread them out on sieves; after a fortnight put them in a stove to finish drying; whiten them, and finish by the process described for the fine sugared almonds.

Superfine Chocolate Sugared Almonds.—Caraccasa cacao-nuts, shelled and roasted, 20 lbs., Martinique sugar, 16 lbs., vanilla 4 drs., starch, 10 oz. The same method is required as for the superfine vanilla sugar plums, but care must be taken in adding the coatings of gum, to touch the cacao nuts lightly, as they are very easily broken.

Superfine Sugared Filberts.—Filberts, 50 lbs., sugar, 4 lbs., starch, 4 oz. Employ the same process as for sugared almonds and flavor to taste. Rose water is generally preferred on account of its color and fragrance.

Coriander Sugar Plums.—Coriander, 2 lbs. farina, 30 lbs. sugar, 14 lbs. The washings of the basin are added to the coriander and farina without making a paste, and the method is followed that has been prescribed for the common sugared almonds; 8 lbs. of sugar are used to whiten them, and 6 to polish them; color after being polished with carmine, Prussian blue, and saffron.

Coriander in Bottles.—Coriander, 10 lbs., farina, 10 lbs., sugar for the whitening, 3 lbs., starch, 1 lb. These are simply colored, and do not require brilliancy. They are made of the size of small peas, and are put into little bottles. In making these follow the receipt for common sugared almonds.

Anise-seed Sugar Plums.—Dry 2 lbs. of green anise-seed in the stove; rub it in the hands to break off the stems, winnow to rid of dust, then put it into a swinging basin, and coat it with sugar boiled to a thread, so as to render the candies hard and brittle. When coated sufficiently, whiten and polish them, like the verdun sugared almonds. They vary in size, being generally as large as a pea.

Mint Sugar Plums.—Dry some peppermint seed in a stove and coat it in the same manner as anise-seed (it must not, however, be whiter than rape seed), whiten and finish like anise-seed. The first coating is sometimes composed of equal parts of peppermint and sugar.

Common Twist Candy.—Clarify 3 lbs. of common brown sugar, and boil it till it is brittle, take it from the fire, pour it in buttered pans; rub the hands with a little butter, and as soon as it is cooled, pull it as you would molasses candy until it is perfectly white; then twist and braid it, and cut it into sticke.

Caramel is made by boiling clarified sugar till it is very brittle, then pouring it on an oiled slab or sheet of tin, and, as soon as it is cool enough to receive an impression with the finger, stamping it in small squares, about an inch in size, with a caramel mould; then turning over the mass, wiping the bottom to remove any oil that may have adhered from the slab, and putting it in a dry place to harden. If you have no caramel mould, you may score it on the slab with a common case knife, after which they are glazed with another coating of sugar. Keep them tightly closed from the air after they are made.

Lemon Caramel is made by grating the yellow rind of a lemon with a lump of sugar ;add to this a few drops of lemon juice with water enough to dissolve the sugar completely, and stir the whole into the boiled syrup a few minutes before it is taken from the fire. *Orange* and *Lime* caramels are prepared in the same manner from these respective fruits. *Coffee caramel*, coffee, 2 oz., sugar, 1 lb. Make an infusion of the coffee, using as little water as possible; strain it through a cloth, and stir it gradually into the boiled syrup a few minutes before taking it from the fire. *Chocolate caramel*, chocolate, 4 oz., sugar, 1 lb. Dissolve the chocolate in as little water as possible, and add it to the boiled sugar, as in the coffee caramels. *Vanilla* and *Orange cream caramels* are made by using the respective essences of these fruits.

Cocoa-Nut Candy.—Pare and cut cocoa-nut into slips, or grate on a coarse grater the white meat of cocoa-nuts until you have ½ a pound; dissolve ½ lb. of loaf sugar in 2 tablespoonfuls of water; put it over the fire, and, as soon as it boils, stir in the cocoa-nut. Continue to stir it until it is boiled to a flake, then pour it on a buttered pan or marble slab, and cut it in whatever form you wish, when it is nearly cold. Lemon or other flavors may be added.

Candy Drops or Pastilles.—Pound and sift double-refined sugar, first through a rather coarse, then through a fine sieve. Put the sugar into an earthen vessel, and dilute it with the flavoring extract, mixed with a little water. If too liquid, the syrup will be too thin, and the drops will run together; while, if too thick, the syrup will be too compact, and cannot be poured out easily. When the sugar is mixed into a rather stiff paste, put it into a small saucepan with a spout, and set it over the fire. As soon as it begins to bubble up the sides of the saucepan, stir it once in the middle, take it from the fire, and drop it in small lumps, of the size and shape required, upon sheets of tin, to stand for 2 hours, then put them in the stove to finish drying. As soon as they are perfectly hard and brilliant, take them from the fire, otherwise they will lose their aroma. Color the syrup just before taking it from the fire.

Orange, Jasmine, and Clove Drops are made by mixing the above paste with these respective extracts:

For Salad Drops.—Water distilled from lettuce is used.

Saffron Drops.—Make an infusion of saffron, strain it, let it cool, use it to mix the paste, and proceed as before.

Heliotrope Drops.—Proceed in the same manner, flavoring the paste with a few drops oil of neroli, or oil of orange, jasmine, and tube-rose, and color violet.

Pink Drops.—Flavor the paste with tincture of red pinks, and color with carmine lake.

Cinnamon Drops.—Mix 5 drs. powdered cinnamon and 8 oz. of sugar with mucilage enough to make it into a paste, and proceed as above.

Marshmallow and Licorice drops are made the same way.

Rose Drops.—Mix the paste with rose water, and color with carmine lake. Proceed as above.

Violet Drops.—Flavor the paste with tincture of Florence iris, and color with blue and carmine lakes. A few drops of tartaric acid may be added to sustain the blue.

Lemon and Orange Drops.—Rasp off the yellow rind of an orange or lemon; mix the raspings with double-refined sugar; add 5 grs. of tartaric acid to every pound of sugar, color with yellow lake or saffron, and proceed as before. If too much tartaric acid is used, the candies will adhere to the sheets of tin.

Coffee Drops.—Substitute a strong, filtered infusion of coffee for water, in mixing the paste.

Chocolate Drops.—For every pound of sugar, take 5 pts. good chocolate, pulverize it, and mix it into a paste, as already directed, taking care not to boil the paste too long, lest it granulate, and become unfit for use.

Vanilla Drops.—Mix the paste with extract of vanilla, or finely-ground vanilla bean: to which add 2 oz. 3 grs. of tartaric acid, dissolved in water, to sustain the blue, without which it would disappear.

Imitation Currant Drops.—Mix the paste with water, adding a little essence of raspberry and of violet, or Florence iris, with a little tartaric acid dissolved in water; color with carmine, and proceed as above.

Peppermint Drops.—Dissolve finely-powdered sugar with a little strong peppermint-water in a saucepan with a spout. As soon as it is thoroughly dissolved, add an equal quantity of coarse-grained sugar with a few drops more of peppermint, stir the whole for a few moments, then drop the mixture on paper, and dry it in the open air. In the same way are made lemon, rose, vanilla, and other drops. Citric and tartaric acid may be used to increase the acidity of lemon drops.

Extemporaneous Pastilles.—Make the paste as usual, without flavoring the water, drop the pastilles upon paper, leave them for two hours, then take them off and put them into the stove to dry. When wanted for use, put the quantity required into a large-mouthed jar, and flavor as desired. For instance, to make 2 lbs. of peppermint drops, take 5 pts. of sulphuric ether in which are diluted a few drops of essence of peppermint, and pour it over the candies, then cover the jar, and shake it until they are thoroughly moistened; then place them on a sieve, and set them in the stove for 5 minutes, evaporate the ether. In this manner rose, orange, lemon, jonquil, tube-rose, mignonette, clove, cinnamon, or any other drops may be made, dissolving their essential oils in sulphuric ether.

Ginger Candy Tablets.—Take 1 lb. loaf sugar, a few drops of acetic acid or the juice of half a lemon, a dessert-spoonful of essence of Jamaica ginger. Boil the sugar with just water enough to dissolve it to the ball degree, then add the acid and the essence, and rub the sugar with the back part of the bowl of a silver spoon up against the sides of the sugar-boiler to whiten or grain it sufficiently to give to the whole an opalized appearance; then pour it into very small-sized moulds, measuring half an inch or an inch oblong square, or else into a tin pan, the bottom part of which is marked out in small tablets, so that the candy may be easily broken into squares when dry. Smear the moulds slightly with oil of almonds. When the sugar is poured into the moulds, place in the screen for half an hour or more, to dry them hard.

Orange Flower Candy Tablets.—Ingredients: 1 lb. loaf sugar, a tablespoonful of orange-flower water, and a few drops of acetic acid. Proceed as directed in the preceding. No color.

Vanilla Candy Tablets.—Ingredients: 1 lb. of loaf sugar, a few drops of essence of vanilla sugar, and a few drops of acetic acid. Proceed as for ornaments in grained sugar.

Peppermint Candy Tablets.—Ingredients: 1 lb. of loaf sugar, a few drops of essence of peppermint, and a few drops of acetic acid. Proceed as above. No color.

Liqueur Candy Tablets.—Ingredients: 1 lb. of loaf sugar, and a gill of any kind of liqueur. Boil the sugar to the crack, then incorporate the liqueur, and finish as in the preceding. No color.

Cinnamon Candy Tablets.—Use 1 lb. loaf sugar, and a few drops essence of cinnamon. Proceed as in the last. This may be colored rose pink, the color to be added while the sugar is boiling.

Clove Candy Tablets are prepared in the same way as the foregoing, essence of cloves being used instead of cinnamon.

Rose Candy Tablets.—Use 1 lb. of loaf sugar, a few drops of essence of roses, a few drops of acetic acid, and a few drops of prepared cochineal. Proceed as in the preceding.

Fruit Candy Tablets.—Use 1 lb. of loaf sugar, ½ pint of the juice of any kind of fruit, either currants, cherries, strawberries, raspberries, &c., extracted by pressing with a spoon through a clean hair-sieve. Boil the sugar to the crack, and then incorporate the fruit juice by rubbing it in with the sugar, as directed in the preceding, and finish the candies as therein indicated.

To free Molasses from its Sharp Taste, and to render it fit to be used instead of Sugar.—Take 24 lbs. molasses, 24 lbs. water, and 6 pounds of charcoal, coarsely pulverized; mix them in a kettle, and boil the whole over a slow wood fire. When the mixture has boiled half an hour, pour it into a flat vessel, in order that the charcoal may subside to the bottom; then pour off the liquid, and place it over the fire once more, that the superfluous water may evaporate, and the molasses be brought to its former consistence. 24 lbs. of molasses will produce 24 lbs. of syrup.

Peppermint Lozenges.—Ingredients; 1 oz. of picked gum tragacanth soaked with 2 oz. of tepid water in a gallipot (this takes some 6 hours), and afterwards squeezed and wrung through a cloth, about 1½ lbs. of fine icing sugar, and a teaspoonful of essence of peppermint. Work the prepared gum with the flattened fist on a very clean slab until it becomes perfectly white and elastic, then gradually work in the sugar, adding the peppermint when the paste has become a compact, smooth, elastic substance; a few drops of thick, wet, cobalt blue should also be added while working the paste, to give it a brilliant whiteness. The paste thus prepared is to be rolled out with fine sugar dredged over the slab to he thickness of two penny pieces, then if you possess a ribbed olling-pin, use it to roll the paste again in cross directions, so as o imprint on its whole surface a small lozenge or diamond pattern. You now use your tin cutter to stamp out the lozenges, and as you do so place them on sugar powdered baking sheets to dry in the creen.

GINGER LOZENGES.—Proceed as in the foregoing; use a tablespoonful of essence of ginger, or 1 oz. of ground ginger to flavor, and a few drops of thick wet gamboge to color the paste. *Hoarhound Lozenges.* Ingredients; 1 oz. of gum dragon soaked in a gill of very strong extract of hoarhound, 1½ lb. of fine icing sugar. Proceed as for the peppermint lozenges. *Cinnamon Lozenges* are prepared in the same manner as ginger or peppermint lozenges, with this difference only; a dessert-spoonful of essence of cinnamon is to be used in the flavoring of them, a few drops of thick, ground, wet-burnt umber should be used with a pinch of carmine to give the paste the tinge of cinnamon color. *Clove Lozenges.* The same as peppermint lozenges, using essence of cloves for flavoring, and burnt umber to color the paste. *Orange Lozenges.* Ingredients; 1 oz. prepared gum, 1½ lb. sugar, 2 oz. of orange-sugar, the gum to be soaked in 2 oz. of orange flower water. Proceed as for peppermint lozenges. *Lemon Lozenges.* Ingredients; 1 oz. prepared gum, 1½ lb. of icing sugar, 2 oz. of lemon sugar, and a few drops of acetic acid. *Colt's foot Lozenges.* Ingredients; 1 oz. of gum dragon soaked in 2 oz. of orange flower water, 1½ lb. of fine icing sugar, and ½ oz of essence of colt's foot. Proceed as for peppermint lozenges. *Cayenne and Catechu Lozenges.* Ingredients; 1 oz. of gum dragon soaked in 2 oz. of water, 2 lbs. fine icing sugar, ½ oz. essence of cayenne, and ½ oz. of prepared catechu. Proceed as for peppermint lozenges.

GUM PASTILLES, OR JUJUBES.—Ingredients; 1 lb. of picked gum arabic, 14 oz. of the finest sugar pounded and sifted, ½ gill of double orange flower water, and 1 pt. tepid water to soak the gum in, which is afterwards to be strained off clean. Put the soaked and strained gum into a sugar boiler with the sugar, and use a clean spoon to stir it over a very moderate fire, while it boils and reduces to the small pearl degree; then add the orange flower water, stir all together on the fire, remove the preparation from the stove, skim off the froth, and use the mixture to cast the jujubes in levelled layers of starch powder contained in a flat box.

SPANISH LICORICE JUJUBES.—Ingredients: 1 lb. picked gum arabic, 14 oz. of sugar, and 2 oz. of Spanish licorice dissolved in a gill of hot water, and afterwards strained clean. First prepare the gum and boil it with the sugar as directed in the preceding article, and when reduced by boiling to the small pearl degree, incorporate the prepared Spanish licorice with it, remove the scum from the surface, and finish the jujubes in the manner indicated above. *Raspberry Jujubes.* Ingredients: 1 lb. picked gum arabic soaked in a pint of hot water and afterwards strained, 14 oz. of sugar, 1 gill of filtered raspberry juice, and a few drops of cochineal. Proceed as directed in the foregoing case, adding the raspberry and coloring last. *Black Currant Jujubes.* Proceed in all respects as indicated for raspberr jujubes, omitting the cochineal, black currant juice being used. *Red Currant Jujubes.* The same as black currant jujubes, red currant juice being used and a few drops of cochineal. *Ordinary Jujubes.* Ingredients: 1 lb. gum arabic soaked in 1 pt. of hot water and afterwards strained, 14 oz. sugar, ½ oz. essence of roses, and a few drops of prepared cochineal. Let the mixture be prepared as for other jujubes, but instead of casting them in impressions made in starch-powder, when the preparation is ready, pour it into a very clean smooth tinned baking sheet to the depth of a quarter of an inch, and set it to dry in the screen, or hot closet (moderate heat); when sufficiently dried, so that on pressing the surface it proves somewhat elastic to the touch, remove it from the heat, and allow it to become cold; the sheet of jujube may then be easily detached, and is to be cut up with scissors in the shape of diamonds.

Stick Apple Sugar.—Boil the sugar to caramel, flavor with apple juice together with tartaric or other acid, pour it on a marble slab, draw it into sticks, cut them of equal length, then roll them on the slab till they are perfectly cold; when finished, wrap them in tissue-paper and put them in fancy envelopes.

Currant and Raspberry Paste Drops.—Ingredients: 1 lb. of pulp (the currants and raspberries in equal proportions boiled, and afterwards rubbed through a sieve), 1 lb. of sifted sugar. Stir both together in a copper sugar-boiler or preserving pan over a brisk fire, until the paste becomes sufficiently reduced to show the bottom of the preserving pan as you draw the spoon across it; then proceed to lay out the drops about the size of a florin, using a spouted sugar boiler for the purpose. The drops should then be placed in the screen to dry, at a low heat for an hour or so. When the drops are dry, use a thin knife to remove them from the tin sheet on which you laid them out, and put them away between sheets of paper in closed boxes, in a dry place. *Damson Paste Drops.* Ingredients: 1 lb. of damson thick pulp, 1 lb. bruised sugar. Stir the pulp and sugar on the fire until reduced to a thick paste, then proceed to lay out the drops on square sheets of polished tin; dry them in the screen (moderate heat), and remove them in the manner aforesaid. These drops may be prepared with all kinds of plums and also with gooseberries. *Pear Paste Drops.* Use 1 lb. pear pulp (made by peeling the pears, and boiling them to a pulp with ½ pt. of cider or perry, and rubbing this through a coarse sieve), 1 lb. of bruised sugar. Proceed as for damson paste. *Apple Paste Drops.* Use 1 lb. of apple pulp (made by peeling, slicing and boiling the apples with ½ pt. cider), 1 lb. of bruised sugar. Proceed as in the foregoing cases, adding a few drops of cochineal to half of the paste for the sake of variety. *Pine Apple Paste Drops.* Use 1 lb. of pine apple pulp (made by first peeling, and then grating the pine-apple on a dish, using a clean coarse tin grater for the purpose), 1 lb. of bruised sugar. Proceed as in the former cases.

Vases, Baskets, Figures, Animals, &c., in Grained Sugar.—The sugar being boiled to the ball degree, add a few drops of acetic acid, and work the sugar with the back part of the bowl of a silver tablespoon up against the side of the sugar boiler, ng up the whole in turns, so that every portion may acquire alized or whitish color. As soon as the sugar has been worked this state, which constitutes "graining," pour it immey into the ready prepared mould; and when it has become tly set firm in the centre, you may turn the vase, basket, l, or whatever the object may be, out of its mould, and place he screen or hot closet to dry, at a *very* moderate heat. Afrds they may be painted in colors to imitate nature.

rton Taffee.—To make this favorite and wholesome candy, 1½ pounds of moist sugar, 3 ounces of butter, a teacup and a of water, and one lemon. Boil the sugar, butter, water, and he rind of the lemon together; and, when done,—which will own by dropping into cold water, when it should be quite —let it stand aside till the boiling has ceased, and then stir e juice of the lemon. Butter a dish, and pour it in about a er of an inch in thickness. The fire must be quick, and the stirred all the time.

ndy Fruit.—Take one pound of the best loaf sugar; dip each into a bowl of water, and put the sugar into your preserving . Boil it down, and skim it until perfectly clear, and in a ring state. When sufficiently boiled, have ready the fruits wish to preserve. Large white grapes, oranges separated into pieces, or preserved fruits, taken out of their syrup and , are very nice. Dip the fruits into the prepared sugar while hot; put them in a cold place; they will soon become hard.

lies without Fruit.—To 1 pint of water put ¼ oz. alum; a minute or two; then add 4 lbs. white sugar; continue the g a little; strain while hot; and, when cold, put in half a ty-five cent bottle of extract of vanilla, strawberry, lemon, y other flavor you desire for jelly.

ize Honey.—Good common sugar, 5 lbs.; water, 2 lbs.; bring ually to a boil, skimming when cool; add 1 lb. bees' honey and ps essence of peppermint. If you desire a better article, use sugar, and ½ lb. less water, ¼ lb. more honey.

other.—Coffee sugar, 10 lbs.; water, 3 lbs.; cream tartar, 2 strong vinegar, 2 tablespoons; white of an egg well beaten; honey, ¼ lb.; Lubin's extract of honeysuckle, 10 drops. Put e sugar and water in a suitable kettle on the fire; when lukea, stir in the cream tartar and vinegar; add the egg; when igar is nearly melted put in the honey, and stir till it comes oil; take it off, let it stand a few minutes; strain, then add xtract of honeysuckle last; stand over night, and it is ready se.

other.—Common sugar, 4 lbs.; water, 1 pt.; let them come oil, and skim. Then add pulverized alum, ¼ oz.; remove the fire, and stir in cream of tartar, ¼ oz., and water, or ct of rose, 1 tablespoonful, and it is fit for use.

Keep Fruits Fresh.—Rosin, 2 lbs.; tallow, 2 oz.; bees'-wax, Melt slowly over the fire in an iron pot, but don't boil. the fruit separately, and rub it over with pulverized chalk or ng (to prevent the coating from adhering to the fruit), then into the solution once, and hold it up a moment to set the g, then pack away carefully in barrels, boxes, or on shelves, in a cool place. Unequalled for preserving apples, pears, lemons, oranges, &c.

Acid Drops.—Pound and sift into a clean pan 8 ozs. of double refined sugar, add slowly as much water as will render the sugar sufficiently moist not to stick to the stirring spoon, place the pan on a small stove or slow fire, and stir till it nearly boils, remove from the fire and stir in ¼ oz. tartaric acid. Place it on the fire for half a minute, then dip out small quantities from the pan, and let it fall in small drops on a clean tin plate; remove the drops in 2 hours with a knife. Ready for sale in 24 hours.

TANNERS, CURRIERS, BOOT, SHOE AND HARNESS MAKERS, MARBLE WORKERS, &c.

Best Color for Boot, Shoe, and Harness Edge.—Alcohol, 1 pint; tincture of iron, 1½ oz.; extract logwood, 1 oz.; pulverized nutgalls, 1 oz.; soft water, ½ pint; sweet oil, ½ oz.; put this last into the alcohol before adding the water. Nothing can exceed the beautiful finish imparted to the leather by this preparation. The only objection is the cost.

Cheap Color for the Edge.—Soft water, 1 gallon; extract logwood, 1 oz.; boil till the extract is dissolved; remove from the fire, add copperas, 2 oz., bichromate of potash and gum arabic, of each ½ oz.; all to be pulverized.

Superior Edge Blacking.—Soft water, 5 gallons; bring to a boil, and add 8 oz. logwood extract, pulverized; boil 3 minutes, remove from the fire, and stir in 2½ oz. gum arabic, 1 oz. bichromate of potash, and 80 grains prussiate of potash.

For a small quantity of this, use water, 2 quarts; extract of logwood, ¾ oz.; gum arabic, 96 grains; bichromate of potash, 48 grains; prussiate of potash, 8 grains. Boil the extract in the water 2 minutes; remove from the fire and stir in the others, and it is ready for use.

For tanners' surface blacking, which is not required to take on a high polish, the gum arabic may be omitted.

Sizing for Boots and Shoes in Treeing Out.—Water, 1 quart; dissolve in it, by heat, isinglass, 1 oz.; adding more water to replace glass, by evaporation; when dissolved, add starch, 6 oz.; extract of logwood, bees'-wax, and tallow, of each, 2 oz. Rub the starch up first by pouring on sufficient boiling water for that purpose. It makes boots and shoes soft and pliable, and gives a splendid appearance to old stock on the shelves.

Black Varnish for the Edge.—Take 98 per cent. alcohol, 1 pint; shellac, 3 oz.; rosin, 2 oz.; pine turpentine, 1 oz.; lampblack, ½ oz.; mix; and when the gums are all cut, it is ready for use. This preparation makes a most splendid appearance when applied to boot, shoe, or harness edge, and is equally applicable to cloth or *wood, where a gloss is* required after being painted.

Best Harness Varnish Extant.—Alcohol, 1 gallon; white turpentine, 1½ lbs.; gum shellac, 1¼ lbs.; Venice turpentine, 1 gill. Let them stand by the stove till the gums are dissolved, then add sweet oil, 1 gill; and color if you wish it with lampblack, 2 oz. This will not crack like the old varnish.

Harness oil.—Neat's-foot oil, 1 gal., lampblack, 4 oz. Mix well.

Brilliant French Varnish for Leather.—Spirit of wine, ¾ pint; vinegar, 5 pints; gum senegal in powder, ½ lb.; loaf sugar, 6 oz.; powdered galls, 2 oz.; green copperas, 4 oz. Dissolve the gum and sugar in the water; strain, and put on a slow fire, but don't boil; now put in the galls, copperas, and the alcohol; stir well for five minutes; set off; and when nearly cool. strain through flannel, and bottle for use. It is applied with a pencil brush. Most superior.

Liquid Japan for Leather.—Molasses, 8 lbs.; lampblack, 1 lb.; sweet oil, 1 lb.; gum arabic, 1 lb.; isinglass, 1 lb. Mix well in 32 lbs. water; apply heat; when cool, add 1 quart alcohol; an ox's gall will improve it.

Waterproof Oil-Blacking, Camphene, 1 pint; add all the India-rubber it will dissolve; currier's oil, 1 pint; tallow, 7 lbs.; lampblack, 2 oz. Mix thoroughly by heat.

Shoemakers' Heel Balls.—Bees'-wax, 8 oz.; tallow, 1 oz.; melt, and add powdered gum arabic, 1 oz., and lampblack to color.

Cement for Leather or Rubber Soles and Leather Belting.—Gutta percha, 1 lb.; India-rubber, 4 oz.; pitch, 2 oz.; shellac, 1 oz.; oil, 2 oz.; melt, and use hot.

Oil Paste Blacking.—Ivory black, 4 lbs.; molasses, 3 lbs.; sweet oil, 1 lb.; oil vitriol, 3 lbs.; mix, and put in tins.

To Dye Leather Blue, Red, or Purple.—For *red*, steep it in alum water, then put it in a warm decoction of Brazil wood; *blue*, steep it in an indigo vat; *purple*, steep the skins in alum water, then put it in a warm decoction of logwood.

Gold Varnish.—Turmeric, 1 dram; gamboge, 1 dram; turpentine, 2 pints; shellac, 5 oz.; sandarach, 5 oz.; dragon's blood, 8 drams; thin mastic varnish, 8 oz.; digest with occasional agitation for fourteen days; then set aside to fine, and pour off the clear.

Grain Black for Harness Leather.—First stain in tallow; then take spirits turpentine, 1 pint; cream of tartar, 1 oz.; soda, 1 oz.; gum shellac, ½ oz.; thick paste, reduced thin, 2 quarts. Mix well. This will finish 12 sides.

Stains for Wood and Leather.—**Red.**—Brazil wood, 11 parts: alum, 4 parts; water, 85 parts. Boil.

Blue.—Logwood, 7 parts; blue vitriol, 1 part; water, 22 parts. Boil.

Black.—Logwood, 9 parts; sulphate of iron, 1 part; water, 25 parts. Boil.

Green.—Verdigris, 1 part; vinegar, 3 parts. Dissolve.

Yellow.—French berries, 7 parts; water, 10 parts; alum, 1 part. Boil.

Purple.—Logwood, 11 parts; alum, 3 parts; water, 29 parts. Boil.

Deer Skins.—Tanning and Buffing for Gloves.—For each skin, take a bucket of water, and put into it one qt. of lime; let the skin or skins lie in from 3 to 4 days; then rinse in clean water, hair, and grain; then soak them in cold water to get out the glue; now scour or pound in good soap-suds for half an hour; after which take white vitriol, alum, and salt, 1 tablespoon of each to a skin; these will be dissolved in sufficient water to cover the skin, and remain in it for 24 hours; wring out as dry as convenient, and spread on with a brush ½ pt. of currier's oil, and hang in the sun about 2 days; after which you will scour out the oil with soap-suds, and hang out again until perfectly dry; then pull and work them until they are soft; and if a reasonable time does not make them soft, scour out in suds again as before, until complete. The oil may be saved by pouring or taking it from the top of the suds, if left standing a short time. The buff color is given by spreading yellow ochre evenly over the surface of the skin, when finished, rubbing it in well with a brush.

TANNING WITH ACID.—After having removed the hair, scouring, soaking, and pounding in the suds, &c., as in the last recipe, in place of the white vitriol, alum, and salt, as there mentioned, take oil of vitriol (sulphuric acid), and water, equal parts of each, and thoroughly wet the flesh-side of the skin with it, by means of a sponge or cloth upon a stick; then folding up the skin, letting it lie for 20 minutes only, having ready a solution of sal-soda and water, say 1 lb. to a bucket of water, and soak the skin or skins in that for two hours, when you will wash in clean water, and apply a little dry salt, letting lie in the salt over night, or that length of time; then remove the flesh with a blunt knife, or, if doing business on a large scale, by means of the regular beam and flesh-knife; when dry, or nearly so, soften by pulling and rubbing with the hands, and also with a piece of pumice-stone. This, of course, is the quickest way of tanning, and by only wetting the skins with the acid, and soaking out in 20 minutes, they are not rotted.

ANOTHER METHOD.—Oil of vitriol, ½ oz.; salt, 1 teacup; milk sufficient to handsomely cover the skin, not exceeding 3 qts.; warm the milk, then add the salt and vitriol; stir the skin in the liquid 40 minutes, keeping it warm; then dry. and work it as directed in the above

LIQUID RED.—Channellers will find that no better or richer color for their purposes can be got than the red ink described under the Grocers' Department, diluted to the required shade. For color for the bottoms of shoes use tincture of red sanders.

BRIDLE STAIN.—Skimmed milk, 1 pt.; spirits of salts, ½ oz.; spts. of red lavender, ½ oz.; gum arabic, 1 oz.; and the juice of 2 lemons; mix well together, and cork for use; apply with a sponge; when dry, polish with a brush or a piece of flannel. If wished paler, put in less red lavender.

NEW TANNING COMPOSITION.—*For harness leather*, 4 lbs. catechu, 3 pts. common lye, 3 oz. of alum. *For wax leather*, (split leather) 3 lbs. catechu, 3 pts. common lye, 3 oz. alum. *For calf-skins*, 2 lbs. catechu, 1 pt. lye, 2 oz. alum. *For sheep-skins*, 1 lb. catechu, 1 pt. lye, 1 oz. alum. The catechu by itself will make the leather hard and brittle, the lye will soften it; the alum, being only used for coloring, can be dispensed with, or other matter used in its place. The mixture is in every case boiled, and the leather is then immersed in it long enough to be thoroughly tanned, for which purpose the harness leather should be steeped from 18 to 20 days, wax leather from 12 to 14 days, calf-skin from 7 to 9 days, and sheep-skin from 2 to 4 days.

Process of Tanning Calf, Kip, and Harness Leather in from 6 to 30 Days.—For a 12-lb. calf-skin, take 3 lbs. of terra japonica, common salt, 2 lbs.; alum, 1 lb.; put them into a copper kettle with sufficient water to dissolve the whole by boiling. The skin will be limed, haired, and treated every way as for the old process, when it will be put into a vessel with sufficient water to cover it, at which time you will put in 1 pint of the composition, stirring it well, adding the same amount each night and morning for three days, when you will add the whole, handling 2 or 3 times daily all the time tanning; you can continue to use the tanning liquid by adding half the quantity each time, by keeping these proportions for any amount. If you desire to give a bark color to the leather, you will put in 1 lb. of Sicily sumac; kip skins will require about 20 days, light house hides for harness 30 days, calf-skins from 6 to 10 days at most.

To Tan Raw Hide.—When taken from the animal, spread it flesh side up; then put 2 parts of salt, 2 parts of saltpetre and alum combined, make it fine, sprinkle it evenly over the surface, roll it up, let it alone a few days till dissolved; then take off what flesh remains, and nail the skin to the side of a barn in the sun, stretch tight, to make it soft like harness leather, put neat's-foot oil on it, fasten it up in the sun again; then rub out all the oil you can with a wedge-shaped stick, and it is tanned with the hair on.

French Finish for Leather.—Take a common wooden pailful of scraps (the legs and pates of calf-skins are best), and put a handful each of salt and alum upon them, and let them stand three days; then boil them until they get a thick paste; in using, you will warm it, and in the first application put a little tallow with it, and for a second time a little soft soap, and use it in the regular way of finishing, and your leather will be soft and pliable, like French leather.

French Patent Leather.—Work into the skin with appropriate tools 3 or 4 successive coatings of drying varnish, made by boiling linseed oil with white lead and litharge, in the proportion of one pound of each of the latter to one gallon of the former, and adding a portion of chalk or ochre, each coating being thoroughly dried before the application of the rest. Ivory black is then substituted for the chalk or ochre, the varnish thinned with spirits of turpentine, and five additional applications made in the same manner as before, except that it is put on thin and not worked in. The leather is rubbed down with pumice-stone, in powder, and then placed in a room at 90 degrees, out of the way of dust. The last varnish is prepared by boiling ½ lb. of asphaltum with 10 lbs. of the drying oil used in the first stage of the process, and then stirring in 5 lbs. copal varnish and 10 lbs. of turpentine. It must have 1 month's age before using it.

Cheap Tanning without Bark or Mineral Astringents.—The astringent liquor is composed of water, 17 gals.; Aleppo galls, ½ lb.; Bengal catechu, 1½ oz. and 5 lbs. of tormentil, or septfoil root. Powder the ingredients, and boil in the water 1 hour; *when cool, put in the* skins (which must be prepared by being plunged into a preparation of bran and water for 2 days previously) ; handle them frequently during the first 3 days, let them alone the next 3 days, then handle three or four times in one day ; let them lie undisturbed for 25 days more, when the process will be complete.

Canadian Process.—The Canadians make four liquors in using the japonica.

The FIRST liquor is made by dissolving, for 20 sides of upper, 15 lbs. of terra japonica in sufficient water to cover the upper, being tanned. The SECOND liquor contains the same amount of japonica, and 8 lbs. of saltpetre also. The THIRD contains 20 lbs. of japonica, and 4½ lbs. of alum. The FOURTH liquor contains only 15 lbs. of japonica, and 1½ lbs. of sulphuric acid ; and the leather remains 4 days in each liquor for upper ; and for sole the quantities and time are both doubled. They count 50 calf-skins in place of 20 sides of upper, but let them lie in each liquor only 3 days.

Fifty Dollar Recipe for Tanning Fur and other Skins.—Remove the legs and useless parts, soak the skin soft, and then remove the fleshy substances, and soak it in warm water 1 hour. Now take for each skin borax, saltpetre, and Glauber-salt, of each ½ oz., and dissolve or wet with soft water sufficient to allow it to be spread on the flesh side of the skin. Put it on with a brush thickest in the centre or thickest part of the skin, and double the skin together, flesh side in ; keeping it in a cool place for 24 hours, not allowing it to freeze. Then wash the skin clean, and take sal-soda, 1 oz., borax, ½ oz. ; refined soap, 2 oz. ; melt them slowly together, being careful not to allow them to boil, and apply the mixture to the flesh side as at first. Boil up again, and keep in a warm place for 24 hours ; then wash the skin clean again, as above, and have saleratus, 2 oz., dissolved in hot rain water sufficient to well saturate the skin ; take alum, 4 oz. ; salt, 8 oz. ; and dissolve also in hot rain water ; when sufficiently cool to allow the handling of it without scalding, put in the skin for 12 hours ; then wring out the water and hang up for 12 hours more to dry. Repeat this last soaking and drying 2 or 3 times, according to the desired softness of the skin when finished. Lastly finish, by pulling and working, and finally by rubbing with a piece of pumice-stone and fine sand-paper. This works like a charm on sheep-skins, fur skins, dog, wolf, bear-skins, &c.

French Polish or Dressing for Leather.—Mix 2 pts. best vinegar with 1 pt. soft water ; stir into it ¼ lb. glue, broken up, ½ lb. logwood-chips, ¼ oz. of finely powdered indigo, ¼ oz. of the best soft soap, ¼ oz. of isinglass ; put the mixture over the fire, and let it boil ten minutes or more ; then strain, bottle, and cork. When cold, it is fit for use. Apply with a sponge.

Curriers' Size.—Take of sizing, 1 qt. ; soft soap, 1 gill ; stuffing, 1 gill ; sweet milk, ½ pt. ; boil the sizing in water to a proper consistence, strain, and add the other ingredients ; and when thoroughly mixed, it is ready for use.

Curriers' Paste.—*First Coat.*—Take of water, 2 qts. ; flour, ½ pint ; Castile soap, 1 oz. ; make into paste. *Second Coat.*—Take of first paste, ½ pt. ; gum tragacanth, 1 gill ; water, 1 pt. ; mix all *together. This* will finish 18 sides of upper.

CURRIERS' SKIRTING.—This is for finishing skirting and the flesh of harness leather, in imitation of oak tanning. Take of chrome yellow, ½ lb.; yellow ochre, 1 lb.; cream of tartar, 1 oz.; soda, ½ oz.; paste, 5 qts.; mix well. This will finish twelve sides.

SKIRTING.—For the grain to imitate oak tan. Take of chrome yellow, ½ lb.; yellow ochre, ½ lb.; cream of tartar, 1 oz.; soda, 1 oz.; paste, 2 qts.; spirits of turpentine, 1 pt.; mix well. This will finish twelve sides.

DYES FOR LEATHER.—*Blue.*—For each skin, take 1 oz. of indigo, put it into boiling water, and let it stand one night; then warm it a little, and with a brush smear the skin twice over, and finish the same as the red. *Red.*—After the skin has been properly prepared with sheep, pigs' dung, &c., then take strong alum water, and sponge over your skin; when dry, boil a strong gall liquor (it cannot be too strong); then boil a strong Brazil wood liquor (the stronger the better); take a sponge, dip it into your liquor, and sponge it over your skin; repeat this till it comes to a full red. To finish your skin, take the white of eggs, and a little gum dragon, mix the two together in half a gill of water, sponge over your skin, and, when dry, polish off. *Yellow.*—1. Infuse quercitron bark in vinegar, in which put a little alum, and brush over your skins with the infusion; finish the same as the red. 2. Take 1 pt. of whisky; 4 oz. turmeric; mix them well together; when settled, sponge your skins over, and finish as above. *Black.*—Put your skin on a clean board, sponge it over with gall and sumach liquors, strong; then take a strong logwood liquor, sponge it over three or four times; then take a little copperas, mix it in the logwood liquor; sponge it over your skin, and finish it same as the red. *Purple.*—First sponge with the alum liquor strong, then with logwood liquor strong; or mix them both, and boil them, and sponge with the liquor; finish the same as the red. The pleasing hues of yellow, brown, or tan color, are readily imparted to leather by the following simple process: steep saffron in boiling water for a number of hours, wet a sponge or soft brush in the liquor, and with it smear the leather. The quantity of saffron, as well as of water, will of course depend on how much dye may be wanted, and their relative proportions to the depth of color required.

TO **MARBLE BOOKS OR PAPER.**—Marbling of books or paper is performed thus: Dissolve 4 ounces of gum arabic in 2 quarts of fair water; then provide several colors mixed with water in pots or shells, and with pencils peculiar to each color; sprinkle them by way of intermixture upon the gum water, which must be put into a trough, or some broad vessel; then, with a stick, curl them, or draw them out in streaks to as much variety as may be done. Having done this, hold your book or books close together, and only dip the edges in, on the top of the water and colors, very lightly; which done, take them off, and the plain impression of the colors in mixture will be upon the leaves; doing as well the ends as the front of the books in like manner, and afterwards glazing the colors.

BOOKBINDERS' VARNISH.—Shellac, 8 parts; gum benzoine, 3 parts; *gum mastic, 2 parts*; bruise, and digest in alcohol, 48 parts; *oil of lavender, ½ part.* Or, digest shellac, 4 parts; gum mastic, 2 parts; gum dammer and white turpentine, of each, 1 part; with alcohol (95 per cent.), 28 parts.

RED SPRINKLE FOR BOOKBINDERS' USE.—Brazil wood (ground), 4 parts; alum, 1 part; vinegar, 4 parts; water, 4 parts. Boil until reduced to 7 parts, then add a quantity of loaf sugar and gum; bottle for use. *Blue.*—Strong sulphuric acid, 8 oz.; Spanish indigo, powdered, 2 oz.; mix in a bottle that will hold a quart, and place it in a warm bath to promote solution. For use, dilute a little to the required color in a tea-cup. *Black.*—No better black can be procured than that made by the receipt for edge blacking, in this work, *which see.* *Orange color.*—Ground Brazil wood, 16 parts; annotto, 4 parts; alum, sugar, and gum arabic, each 1 part; water, 70 parts, boil, strain, and bottle. *Purple.*—Logwood chips, 4 parts; powdered alum, 1 part; soft water, 24 parts; boil until reduced to 16 parts, and bottle for use. *Green.*—French berries, 1 part; soft water, 8 parts. Boil, and add a little powdered alum; then bring it to the required shade of green, by adding liquid blue. *Brown.*—Logwood chips, 1 part; annotto, 1 part; boil in water, 6 parts; if too light, add a piece of copperas the size of a pea.

TREE-MARBLE.—A marble in the form of trees may be done by bending the boards a little on the centre, using the same method as the common marble, having the covers previously prepared. The end of a candle may be rubbed on different parts of the board to form knots. *Rice-Marble.*—Color the cover with spirits of wine and turmeric, then place on rice in a regular manner, throw on a very fine sprinkle of copperas water till the cover is nearly black, and let it remain till dry. The cover may be spotted with the red liquid or potash-water, very freely, before the rice is thrown off the boards. *Spotted Marble for Books, etc.*—After the fore-edge of the book is cut, let it remain in the press, and throw on linseeds in a regular manner, sprinkle the edge with any dark color till the paper is covered, them shake off the seeds. Various colors may be used; the edge may be colored with yellow or red before throwing on the seeds, and sprinkling with blue. The seeds will make a fine fancy edge when placed very thick on different parts, with a few slightly thrown on the spaces between. *Japan Coloring for Leather, Book-covers, etc.*—After the book is covered and dry, color the cover with potash-water mixed with a little paste: give 2 good coats of Brazil wash, and glaze it; put the book between the hands, allowing the boards to slope a little; dash on copperas-water, then with a sponge full of red liquid press out on the back and on different parts large drops, which will run down each board and make a fine shaded red; when the cover is dry, wash it over 2 or three times with Brazil wash to give it a brighter color. (*See the various dyes for leather.*)

GOLD SPRINKLE FOR BOOKS.—Put in a marble mortar ½ oz. pure honey and one book of gold leaf, rub them well together until they are very fine, add ½ pint clear water, and mix well together when the water clears, pour it off, and put in more till the honey is all extracted, and nothing remains but the gold; mix one grain of corrosite sublimate in a teaspoonful of spirits of wine, and when dissolved, put the same, together with a little gum water, to the gold, and bottle for use. The edges of the book may be sprinkled or colored very dark, with green, blue, or purple, and lastly with the gold liquid in small or large spots, very regular, shaking the bottle before using. Burnish the edges when dry, and cover them with paper to prevent the dust falling thereon. This sprinkle will have a most beautiful appearance on extra work.

TO GILD THE EDGES OF BOOKS.—Armenian bole, 4 parts, sugar candy, 1 part, white of egg to mix. Apply this composition to the edge of the leaves, previously firmly screwed in the cutting-press; when nearly dry, smooth the surface with the burnisher; then take a damp sponge and pass over it, and with a piece of cotton-wool, take the leaf from the cushion and apply it to the work; when quite dry, burnish, observing to place a piece of silver or India paper between the gold and the agate.

CHINESE EDGE FOR BOOKS.—Color the edge with light liquid blue and dry; then take a sponge charged with vermilion, and dab on spots according to fancy; next throw on rice, and finish the edge with dark liquid blue.

DYES FOR FEATHERS.—*Green Dye.*—Take of verdigris and verditer, of each, 1 oz.; gum-water, 1 pt.; mix them well, and dip the bristles, fur, or feathers, they having been first soaked in hot water, into the said mixture. *Blue.*—Take of Indigo and risse, each, 1 oz.; and a piece of alum the size of a hazel nut; put them into gum-water, and dip the materials into it hot; hang them up to dry, and clap them well that they may open; and, by changing the colors, the aforesaid materials may be in this manner dyed of any color. For *purple*, use lake and indigo; for *carnation*, vermilion and smalt. *Red.*—Take an ounce of Brazil wood in powder; ½ oz. of alum; vermilion, ¼ oz.; and a pint of vinegar; boil them up to a moderate thickness, and dip the fur or feathers, they having been first soaked in hot water, into the said mixture. For *black*, use the same as for cloth. (*See* "*Receipts for Dyeing.*") *Yellow.*—Mordant with acetate of alumina, and dip in a bath of turmeric or weld. *Crimson.*—Dip in acetate of alumina mordant, then in a boiling hot decoction of Brazil wood, and, last of all, pass through a bath of cudbear.

TO MAKE PAPER INTO PARCHMENT.—To produce this transformation, take unsized paper and plunge it into a solution of two parts of concentrated sulphuric acid combined with 1 part water; withdraw it immediately, and wash it in clean water, and the change is complete. It is now fit for writing; for the acid supplies the want of size, and it becomes so strong that a strip 2 or 3 inches wide will bear from 60 to 80 lbs. weight, while a like strip of parchment will bear only about 25 lbs.

HORN IN IMITATION OF TORTOISE-SHELL.—First steam and then press the horn into proper shapes, and afterwards lay the following mixture on with a small brush, in imitation of the mottle of tortoise-shell: Take equal parts of quick lime and litharge, and mix with strong soap-lees; let this remain until it is thoroughly dry; brush off, and repeat two or three times if necessary. Such parts as are required to be of a reddish brown should be covered with a mixture of whiting and the stain.

Dyes for Ivory, Horn, and Bone.—*Black.*—1. Lay the articles for several hours in a strong solution of nitrate of silver, and expose to the light. 2. Boil the article for some time in a strained decoction of logwood, and then steep it in a solution of per-sulphate or acetate of iron. 3. Immerse frequently in ink until of sufficient depth of color. *Blue.*—1. Immerse for some time in a dilute solution of sulphate of indigo, partly saturated with potash, and it will be fully stained. 2. Steep in a strong solution of sulphate of copper. *Green.*—1. Dip blue-stained articles for a short time in nitro-hydrochlorate of tin, and then in a hot decoction of fustic. 2. Boil in a solution of verdigris in vinegar until the desired color is obtained. *Red.*—1. Dip the articles first in a tin mordant, used in dyeing, and then plunge into a hot decoction of Brazil wood—½ lb. to a gallon of water—or cochineal. 2. Steep in red ink till sufficiently stained. *Scarlet.*—Use lac dye instead of the preceding. *Violet.*—Dip in the tin mordant, and then immerse in a decoction of logwood. *Yellow.*—Boil the articles in a solution of alum, 1 lb. to ½ a gallon, then immerse for half an hour in the following mixture: Take ½ lb. of turmeric, and ¼ lb. of pearl-ash; boil in 1 gal. water: when taken from this, the bone must be again dipped in the alum solution.

Etching Fluid for Ivory.—Take dilute sulphuric acid, dilute muriatic acid, equal parts: mix. For etching varnish take white wax, 2 parts; tears of mastic, 2 parts: mix.

To gild Ivory.—Immerse it in a solution of nitro-muriate of gold, and then expose it to hydrogen gas while damp. Wash it afterwards in clean water.

To soften Ivory.—In 3 oz. spirits of nitre and 15 oz. of spring-water, mixed together, put your Ivory to soak; and in three or four days it will obey your fingers.

To whiten Ivory.—Slack some lime in water; put your ivory in the water, after being decanted from the grounds, and boil it till it looks quite white. To polish it afterwards, set it in the turner's wheel; and, after having worked, take rushes and pumice-stones, subtile powder, with water, and rub it till it looks perfectly smooth. Next to that, heat it by turning it against a piece of linen or sheep-skin leather: and when hot, rub it over with a little dry whitening diluted in oil of olive; then with a little dry whitening alone; finally with a piece of soft white rag. When all this is performed as directed, the ivory will look very white.

Another way to Bleach Ivory.—Take 2 handfuls of lime, slake it by sprinkling it with water: then add 3 pts. of water, and stir the whole together; let it settle ten minutes, and pour the water into a pan for your purpose. Then take your ivory and steep it in the lime-water for 24 hours, after which, boil it in a strong alum-water 1 hour, and dry it in the air.

Additional Dyes for Feathers.—*Black:* immerse for 2 or 3 days in a bath, at first hot, of logwood, 8 parts, and copperas or acetate of iron, 1 part. *Blue:* with the indigo vat. *Brown:* by using any of the brown dyes for silk or woollen. *Crimson:* a mordant of alum, followed by a hot bath of Brazil wood, afterwards by a weak dye of cudbear. *Pink* or Rose: with saf-flower or lemon juice. *Plum:* with the red dye, followed by an alkaline bath. *Red:* a mordant of alum, followed by a bath of Brazil wood. *Yellow:* a mordant of alum, followed by a bath of turmeric or weld.

COLORS FOR ARTIFICIAL FLOWERS.—The French employ *velvet, fine cambric*, and *kid* for the *petals*, and *taffeta* for the leaves. Very recently thin plates of *bleached* whalebone have been used for some portions of the artificial flowers. *Colors and Stains. Blue.*—Indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting. *Green.*—A solution of distilled verdigris. *Lilac.*—Liquid archil. *Red.*—Carmine dissolved in a solution of salt of tartar, or in spirits of hartshorn. *Violet.*—Liquid archil mixed with a little salt of tartar. *Yellow.*—Tincture of turmeric The colors are generally applied with the fingers.

TO CUT AND POLISH MARBLE.—The marble saw is a thin plate of soft iron, continually supplied, during its sawing motion, with water and the sharpest sand. The sawing of moderate pieces is performed by hand: that of large slabs is most economically done by a proper mill. The first substance used in the polishing process is the sharpest sand, which must be worked with till the surface becomes perfectly flat. Then a second and even a third sand, of increasing fineness, is to be applied. The next substance is emery, of progressive degrees of fineness; after which, tripoli is employed; and the last polish is given with tin putty. The body with which the sand is rubbed upon the marble is usually a plate of iron; but, for the subsequent process, a plate of lead is used, with fine sand and emery. The polishing-rubbers are coarse linen cloths, or bagging, wedged tight into an iron planing tool. In every step of the operation, a constant trickling supply of water is required.

ALABASTER, MARBLE, OR STONE may be stained of a yellow, red, green, blue, purple, black, or any of the compound colors, by the stains used for wood.

POWERFUL CEMENT FOR BROKEN MARBLE.—Take gum arabic, 1 lb.; make into a thick mucilage: add to it powdered plaster of Paris, 1½ lb.; sifted quick lime, 5 oz.; mix well; heat the marble, and apply the mixture.

SEVEN COLORS FOR STAINING MARBLE.—It is necessary to heat the marble hot, but not so hot as to injure it, the proper heat being that at which the colors nearly boil. *Blue;* alkaline indigo dye, or turnsole with alkali. *Red;* dragon's blood in spirits of wine. *Yellow;* gamboge in spirits of wine. *Gold Color;* sal-ammoniac, sulphate of zinc, and verdigris, equal parts. *Green;* sap green, in spirits of potash. *Brown;* tincture of logwood. *Crimson;* alkanet root in turpentine. Marble may be veined according to taste. To stain marble *well* is a difficult operation.

PERPETUAL INK FOR TOMBSTONES, ETC.—Pitch, 11 lbs.; lampblack, 1 lb.; turpentine sufficient; mix with heat.

TO CLEAN OLD MARBLE.—Take a bullock's gall, 1 gill soap lees, half a gill of turpentine; make into a paste with pipeclay, apply it to the marble; let it dry a day or two, then rub it off, and it will appear equal to new; if very dirty, repeat the application.

TO EXTRACT OIL FROM MARBLE OR STONE.—Soft soap, 1 part; fullers earth, 2 parts; *potash, 1 part;* boiling water to mix. Lay it on *the spots of grease, and let it* remain for a few hours.

To Clean Marble.—Take two parts of common soda, 1 part pumice stone, and 1 part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.

To make a Chemical Barometer.—Take a long, narrow bottle, and put into it 2½ drs. of camphor; spirits of wine, 11 drs. When the camphor is dissolved, add to it the following mixture: water, 9 drs.; saltpetre, 38 grs.; sal-ammoniac, 38 grs. Dissolve these salts in the water prior to mixing with the camphorated spirit; then shake all well together, cork the bottle well, wax the top, but afterwards make a very small aperture in the cork with a red-hot needle. By observing the different appearances which the materials assume as the weather changes, it becomes an excellent prognosticator of a coming storm or of a sunny sky.

Printer's Rollers are made of glue and molasses, with sometimes a little Spanish white. The proportions are 1 lb. glue to 1 pint molasses. Break the glue to pieces, soak for 24 hours, then melt the molasses, and cast in a mould previously oiled to prevent it from sticking. When it gets hard after long use, remelt it, using a little more molasses.

Savage's Printing Ink.—Pure balsam of copaiba, 9 oz; lampblack, 3 oz.; indigo and Prussian blue, each 5 drams; Indian red, ¾ oz.; yellow soap, 3 oz. Mix, and grind to the utmost smoothness.

Trapper's and Angler's Secret for Game and Fish.—A few drops of oil of anise, or oil rhodium, on any trapper's bait, will entice any wild animal into the snare trap. India cockle mixed with flour dough, and sprinkled on the surface of still water, will intoxicate fish, rendering them insensible; when coming up to the surface, they can be lifted into a tub of fresh water to revive them, when they may be used without fear.

RECEIPTS FOR CABINETMAKERS, PAINTERS, GILDERS, BRONZERS, GLASS STAINERS, &c.

Cheap Black Walnut Stain.—Burnt umber, 2 parts, rose pink, 1 part, glue, 1 part, water sufficient; heat all together and dissolve completely, apply to the work first with a sponge, then go over it with a brush, and varnish over with shellac.

Ebony Stain.—Drop black, 2 parts, rose pink, 1 part, turpentine, a sufficient quantity.

Bright Yellow Stain.—1. Brush over with the tincture of turmeric. 2. Warm the work, and brush it over with weak aquafortis varnish or oil as usual. 3. A very small bit of aloes put into the varnish will give a rich yellow color to the wood.

Extra Black Stain for Wood.—Pour 2 quarts boiling water over 1 oz. of powdered extract of logwood, and, when the solution is effected, 1 dr. of yellow chromate of potash is added, and the whole well stirred. It is then ready for use as a wood-stain, or for writing ink. When rubbed on wood, it produces a pure black. Repeat with 2, 3, or 4 applications, till a deep black is produced, which acquires the highest beauty when polished or stained.

Imitation of Mahogany.—Let the first coat of painting be white lead, the second, orange, and the last, burnt umber or sienna: imitating the veins according to your taste and practice.

To Imitate Wainscot.—Let the first coat be white; the second, half white and half yellow ochre; and the third, yellow ochre only; shadow with umber or sienna.

To Imitate Satin Wood.—Take white for your first coating, light blue for the second, and dark blue or dark green for the third.

Rosewood Satin, very Bright Shade.—Used Cold.—Take alcohol. 1 gal.; camwood, 2 oz.; set them in a warm place 24 hours; then add extract of logwood, 3 oz.; aquafortis, 1 oz.; and when dissolved, it is ready for use; it makes a very bright ground like the most beautiful rosewood; 1, 2, or more coats as you desire, over the whole surface.

Varnish for Frames, etc.—Lay the frames over with tin or silver foil by means of plaster of Paris, glue or cement of some kind, that the foil may be perfectly adherent to the wood; then apply your gold lacquer varnish, which is made as follows: Ground turmeric, 1 lb.; powdered gamboge, 1½ ounces; powdered sandarach, 3½ lbs; powdered shellac, ¾ lbs.; spirits of wine, 2 gals.; dissolve and strain; then add turpentine varnish, 1 pt.; and it is ready for use.

Cherry Stain.—Rain water, 3 qts.; annotto, 4 oz.; boil in a copper kettle till the annotto is dissolved, then put in a piece of potash the size of a walnut; keep it on the fire about half an hour longer, and it is ready to bottle for use.

Rosewood Stain, Light Shade.—Equal parts of logwood and red-wood chips, boil well in water sufficient to make a strong stain; apply it to the furniture while hot; 2 or 3 coats according to the depth of color desired.

Rose Pink Stain and Varnish.—Put 1 oz. of potash in 1 qt. water, with red sanders, 1½ oz.; extract the color from the wood and strain; then add gum shellac, ½ lb., dissolve it by a brisk fire. Used upon logwood stain for rosewood imitation.

Blue Stain for Wood.—1. Dissolve copper filings in aquafortis, brush the wood with it, and then go over the work with a hot solution of pearlash (2 oz. to 1 pt. of water) till it assumes a perfectly blue color. 2. Boil 1 lb. of indigo, 2 lbs. wood, and 3 oz. alum, in 1 gal. water, brush well over until thoroughly stained.

Imitation of Botany-Bay Wood.—Boil ½ lb. French berries (the unripe berries of the *Rhamnus infectorius*) in 2 qts. water till of a deep yellow, and while boiling hot, give 2 or 3 coats to the work. If a deeper color is desired, give a coat of logwood decoction over the yellow When nearly dry, form the grain with No. 8, *black stain*, used hot, and, when dry, rust and varnish.

Mahogany Color—Dark.—1. Boil ½ lb. of madder and 2 oz. logwood-chips in a gallon of water, and brush well over while hot; when dry go *over the whole* with pearlash solution, 2 drs. to the *quart.* 2 *Put 2 oz. dragon's* blood, bruised, into a quart of oil of turpentine; let the bottle stand in a warm place, shake frequently, and, when dissolved, steep the work in the mixture.

Box-Wood Brown Stain.—Hold your work to the fire, that it may receive a gentle warmth; then take aquafortis, and, with a feather, pass it over the work till you find it change to a fine brown (always keeping it near the fire); you may then varnish or polish it.

Light Red Brown.—Boil ½ lb. madder and ¼ lb. fustic in 1 gal. water; brush over the work, when boiling hot, until properly stained. 2. The surface of the work being quite smooth, brush over with a weak solution of aquafortis, ½ oz. to the pint; then finish with the following:—Put 4½ oz. dragon's blood and 1 oz. soda, both well bruised, to 3 pts. spirits of wine, let it stand in a warm place, shake frequently, strain and lay on with a soft brush, repeating until of a proper color: polish with linseed oil or varnish.

Purple.—Brush the work several times with the logwood decoction used for *No.* 6, *Black;* and, when dry, give a coat of pearlash solution, 1 dr. to a quart: lay it on evenly.

Red.—1. Boil 1 lb. Brazil wood and 1 oz. pearlash in a gal. of water; and, while hot, brush over the work until of a proper color. Dissolve 2 oz. alum in 1 qt. water, and brush the solution over the work before it dries. 2. Take a gallon of the above stain, add 2 oz. more pearlash; use hot, and brush over with the alum solution. 3. Use a cold solution of archil, and brush over with the pearlash solution for *No.* 1, *Dark mahogany.*

Mahogany Stain on Wood.—Take nitric acid, dilute with 10 parts of water, and wash the wood with it. To produce *rosewood* finish, glaze the same with carmine or Munich lake. Asphaltum, thinned with turpentine, forms an excellent mahogany color on new work.

Beautiful Varnish for Violins, &c.—Rectified spirits of wine, ½ gal.; add 6 oz. gum sandarach, 3 oz. gum mastic, and ½ pt. turpentine varnish; put the above in a tin can by the stove, frequently shaking till well dissolved: strain and keep for use. If you find it harder than you wish, thin with more turpentine varnish

Another.—Heat together at a low temperature 2 qts. of alcohol, ½ pt. turpentine varnish, and 1 lb. clean gum mastic; when the latter is thoroughly dissolved, strain through a cloth.

Crimson Stain for Musical Instruments.—Ground Brazil wood, 1 lb.; water, 3 qts.; cochineal, ½ ounce; boil the Brazil with the water for an hour, strain, add the cochineal: boil gently for half an hour, when it will be fit for use. If you wish a *scarlet tint*, boil an ounce of saffron in a quart of water, and pass over the work before you stain it.

Purple Stain.—Chipped logwood, 1 lb.; water, 3 qts.; pearlash, 4 ounces; powdered indigo, 2 ounces. Boil the logwood in the water half an hour, add the pearlash and indigo, and when dissolved, you will have a beautiful purple.

Green Stain.—Strong vinegar, 3 pts.; best verdigris, 4 ounces, ground fine; sap green, ½ ounce: mix together.

Black Stains for Wood.—1. Drop a little sulphuric acid into a small quantity of water; brush over the wood and hold it to the fire, *it will be a fine* black and receive a good polish. 2. For a beautiful *black, on wood,* nothing can exceed the black Japan mentioned under Tinsmith's Department. Apply two coats; after which, varnish and polish it. 3. To 1 gal. vinegar, add a quarter of a pound of iron rust; let it stand for a week; then add a pound of dry lampblack, and three-quarters of a pound copperas; stir it up for a couple of days. Lay on five or six coats with a sponge, allowing it to dry between each; polish with linseed-oil and a soft woollen rag, and it will look like ebony. Incomparable for iron work, ships' guns, shot, &c 4. Vinegar, ½ gal.; dry lampblack, ½ lb., iron-rust sifted, 3 lbs.; mix and let stand for a week. Lay three coats of this on hot, and then rub with linseed oil, and you will have a fine deep black. 5. Add to the above stain, nut-galls, 1 oz.; logwood-chips, ½ lb.; copperas, ¼ lb.; lay on three coats; oil well, and you will have a black stain that will stand any kind of weather, and is well adapted for ships' combings, &c 6 Logwood-chips, ½ lb.; Brazil-wood, ¼ lb; boil for 1½ hours in 1 gal. water Brush the wood with this decoction while hot; make a decoction of nut-galls, by simmering gently, for three or four days, a quarter of a pound of the galls in 3 qts. water; give the wood three coats, and, while wet, lay on a solution of sulphate of iron (2 oz to a quart), and, when dry, oil or varnish 7 Give three coats with a solution of copper filings in aquafortis, and repeatedly brush over with the logwood decoction until the greenness of the copper is destroyed. 8. Boil ½ lb logwood-chip in 2 quarts water; add an ounce of pearlash, and apply hot with a brush. Then take 2 qts. of the logwood decoction, and ½ oz. of verdigris, and the same of copperas; strain, and throw in ½ lb of iron rust. Brush the work well with this, and oil.

MISCELLANEOUS STAINS.—*Yellow* is produced by diluted nitric acid. *Red* is produced by a solution of dragon's blood in spirits of wine *Black* is produced by a strong solution of nitric acid. *Green* is produced by a solution of verdigris in nitric acid; then, dipped in a hot solution of pearlash produces a *Blue stain* *Purple* is produced by a solution of sal-ammoniac in nitric acid

FINISHING WITH ONE COAT OF VARNISH.—*Valuable Process*—Give the furniture a coat of boiled linseed oil, then immediately sprinkle dry whiting upon it, and rub it in well with your hand or a stiff brush, all over the surface; the whiting absorbs the oil, and fills the pores of the wood completely. For black walnut, add a little burned umber to the whiting; for cherry, a little Venetian red, &c, according to the color of the wood Turned work can have it applied while in motion in the lathe. Furniture can afterwards be finished with only one coat of varnish.

MAHOGANY STAIN ON MAPLE.—Dragon's blood, ½ oz.; alkanet, ¼ oz.; aloes, 1 dr.; spirits of wine, 16 oz.; apply it with a sponge or brush.

TO POLISH WOOD.—Take a piece of pumice-stone and water, and pass repeatedly over the work until the rising of the grain is cut down Then take powdered tripoli and boiled linseed oil, and polish the work to a bright surface.

CLOCK CASE AND PICTURE FRAME FINISH.—Copal varnish, 2 lbs.; linseed oil varnish, ½ oz.; mix well, shake often, and place in a warm spot The wood to be varnished is prepared with a thin coat of glue-water, and rubbed down with fine pumice-stone or something equivalent. In light-colored wood, a light pigment, such as chalk, is added to the glue-water; in dark wood, a dark pigment is added. When ready, the articles are varnished with the above mixture, and, after drying, rubbed with a solution of wax in ether, thereby receiving a high polish.

FANCY FIGURES ON WOOD.—Slack some lime in stale urine. Dip a brush in it, and form on the wood figures to suit your fancy. When dry, rub it well with a rind of pork.

BLACK WALNUT POLISH.—Take pulverized asphaltum; put it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put in a warm place, and shake occasionally; when dissolved, strain, and apply it to the wood with a cloth or stiff brush; should it prove too dark, dilute with turpentine or benzole. If desired to bring out the grain still more apply a mixture of boiled oil and turpentine; this is better than oil alone. When the oil is dry, the wood can be polished with the following. Shellac varnish, 2 parts; boiled oil, 1 part. shake it well before using. Apply with a cloth, rubbing briskly.

POLISHES.—1. *Carvers' Polish.*—White resin, 2 oz.; seed lac, 2 oz.; spirits of wine, 1 pt. Dissolve. It should be laid on warm. Avoid moisture and dampness when used. 2. *French Polish.*—Gum shellac, 1 oz., gum arabic, ¼ oz; gum copal, ¼ oz. Powder, and sift through a piece of muslin; put them in a closely corked bottle with 1 pt. spirits of wine, in a very warm situation, shaking every *day* till the gums are dissolved: then strain through muslin, and cork for use. 3. *Polish for Dark-colored Woods.*—Seedlac, 1 oz.; gum guaiacum, 2 drs.; dragon's blood, 2 drs.; gum mastic, 2 drs.; put in a bottle with 1 pt. spirits of wine, cork close, expose to a moderate heat till the gums are dissolved; strain into a bottle for use, with ¼ gill of linseed oil: shake together. 4. *Waterproof Polish.*—Gum benjamin, 2 oz.; gum sandarach, ¼ oz.; gum anima, ¼ oz.; spirits of wine, 1 pt.; mix in a closely stopped bottle, and place either in a sand bath or in hot water till the gums are dissolved, then strain off the mixture, shake it up with ¼ gill of the best clear poppy oil, and put it by for use. 5. *Finishing Polish.*—Gum shellac, 2 drs., gum benjamin, 2 drs.; put into ½ pt. of best rectified spirits of wine in a bottle closely corked; keep in a warm place, shaking frequently till the gums are dissolved. When cold, shake up with it two teaspoonfuls of the best clear poppy oil.

POLISH FOR REMOVING STAINS, SPOTS, AND MILDEW FROM FURNITURE.—Take of 98 per cent. alcohol, ½ pint.; pulverised rosin and gum shellac, of each, ¼ oz. Let these cut in the alcohol; then add linseed oil, ½ pt.; shake well, and apply with a sponge, brush, or cotton flannel, or an old newspaper, rubbing it well after the application, which gives a nice polish.

POLISH FOR REVIVING OLD FURNITURE.—Take alcohol, 1½ oz., spirits of salts (muriatic acid), ½ oz.; linseed oil, 8 oz.; best vinegar, ½ pt.; and butter of antimony, 1½ oz.; mix, putting in the vinegar last.

JET OR POLISH FOR WOOD OR LEATHER, BLACK, RED, OR BLUE.—Alcohol (98 per cent.), 1 pt., sealing wax, the color desired, 3 *sticks; dissolve* by heat, and have it warm when applied. A sponge *is the best* to apply it with.

Polish for Turners' Work.—Dissolve sandarach, 1 oz., in spirit of wine, ½ pt.; next shave bees'-wax, 1 oz.; and dissolve it in a sufficient quantity of spirits of turpentine to make it into a paste; add the former mixture by degrees to it, then with a woollen cloth apply it to the work while it is in motion in the lathe, and with a soft linen rag polish it. It will appear as if highly varnished.

Furniture Polish.—Bees'-wax, ½ lb., and ¼ of an oz. of alkanet root; melt together in a pipkin until the former is well colored. Then add linseed oil and spirits of turpentine, of each half a gill; strain through a piece of coarse muslin.

French Polishes.—1. Shellac, 3 lbs.; wood naphtha, 3 pts.; dissolve. 2. Shellac, 2 lbs.; powdered mastic and sandarach, of each 1 oz.; copal-varnish, ½ pint; spirits of wine, 1 gal. Digest in the cold till dissolved.

Oil Finish.—1. Linseed oil, 16 oz.; black rosin, 4 oz.; vinegar, 4 oz. rectified spirits, 3 oz.; butter of antimony, 10 oz.; spirit of salts, 2 oz.; melt the rosin, add the oil, take it off the fire, and stir in the vinegar; let it boil for a few minutes, stirring it; when cool, put it into a bottle, add the other ingredients, shaking all together. 2. Linseed oil, 1 pt.; oil of turpentine, ½ pt.; rectified spirit, 4 ozs.; powdered rosin, 1½ oz.; rose pink, ½ oz.; mix.

Furniture Pastes.—1. Bees'-wax, spirits of turpentine, and linseed oil, equal parts; melt and cool. 2. Bees'-wax, four ounces; turpentine, 10 oz.; alkanet root, to color; melt and strain. 3. Bees'-wax, 1 lb.; linseed oil, 5 oz.; alkanet root, ½ oz.; melt, and add 5 oz. of turpentine; strain and cool .4. Bees'-wax, 4 oz.; resin, 1 oz.; oil of turpentine, 2 oz.; Venetian red, to color.

Furniture Paste.—1. Turpentine, 1 pt.; alkanet root, ½ oz.; digest until sufficiently colored, then add bees'-wax, scraped small, 4 oz.; put the vessel into hot water, and stir till dissolved. If wanted *pale*, the alkanet root should be omitted. 2. (*White.*) White wax, 1 lb.; liquor of potassa, ½ gal.; boil to a proper consistence. 3. Bees'-wax, 1 lb.; soap, ¼ lb.; pearlash, 3 oz. (dissolved in water, ½ gal., and strained); boil as last. 4. Yellow wax, 18 parts; resin, 1 part; alkanet root, 1 part; turpentine, 6 parts; linseed oil, 6 parts. First steep the alkanet in the oil with heat, and, when well colored, pour off the clear on the other ingredients, and again heat till all are dissolved.

Furniture Cream.—Bees'-wax, 1 lb.; soap, 4 oz.; pearlash, 2 oz.; soft water, 1 gal.; boil together until mixed.

Furniture Oils.—1. Acetic acid, 2 drs.; oil of lavender, ½ dr.; rectified spirit, 1 dr.; linseed oil, 4 oz. 2. Linseed oil, 1 pt.; alkanet root, 2 oz.: heat, strain, and add lac varnish, 1 oz. 3. Linseed oil, 1 pt.; rectified spirit, 2 oz.; butter of antimony, 4 oz. 4. Linseed oil, 1 gal.; alkanet-root, 3 oz.; rose pink, 1 oz. Boil them together ten minutes, and strain so that the oil be quite clear.

Wood-filling Composition.—Boiled linseed oil, 1 qt.; turpentine, 3 qts.; corn starch, 5 lbs.; Japan, 1 qt.; calcined magnesia, 2 oz. Mix thoroughly.

Improved Wood-filling Composition.—Whitening, 6 oz.; Japan, ½ pt.; boiled linseed *oil, ½ pt.;* turpentine, ½ pt.; corn starch, 1 *oz. Mix well together and apply* to the wood. On walnut wood add a little burned umber, on cherry a little Venetian red, to above mixture.

DYES FOR VENEERS.—*A fine Black.*—Put 6 lbs. of logwood ch into your copper, with as many veneers as it will hold with pressing too tight, fill it with water, let it boil slowly for abou hours, then add ½ lb. of *powdered verdigris*, ½ lb. copperas, brui gall-nuts, 4 oz.; fill the copper up with vinegar as the water eva rates; let it boil gently 2 hours each day till the wood is d through. *A fine Blue.*—Put oil of vitriol, 1 lb., and 4 oz. of best powdered indigo, in a glass bottle. Set it in a glazed eart pan, as it will ferment. Now put your veneers into a copper stone trough; fill it rather more than one-third with water, add as much of the vitriol and indigo (stirring it about) as make fine blue, testing it with a piece of white paper or wood. the veneers remain till the dye has struck through. Keep the solut of indigo a few weeks before using it; this improves the color. *Yellow.*—Reduce 4 lbs. of the root of barberry to dust by sawi which put in a copper or brass trough; add turmeric, 4 oz.; wa 4 gals.; then put in as many white holly veneers as the liquor cover. Boil them together for 3 hours, often turning them. When c add aquafortis, 2 oz., and the dye will strike through much soo *Bright Green.*—Proceed as in the previous receipt to produc yellow; but, instead of aquafortis, add as much of the vitriola indigo (see above, under blue dye) as will produce the desi color. *Bright Red.*—Brazil dust, 2 lbs.; add water, 4 gals. in as many veneers as the liquid will cover; boil them for 3 ho then add alum, 2 oz., aquafortis, 2 oz.; and keep it luke-warm u it has struck through. *Purple.*—To 2 lbs. of chip logwood an lb. Brazil dust, add 4 gals. of water; and after putting in y veneers, boil for 3 hours; then add pearlash, 6 oz., and alum, 2 let them boil for 2 or 3 hours every day till the color has str through. *Orange.*—Take the veneers out of the above yellow d and while still wet and saturated, transfer them to the bright dye till the color penetrates throughout.

TO IMPROVE THE COLOR OF STAINS.—Nitric acid, 1 oz.; muria acid, ½ teaspoonful; grain tin, ¼ oz.; rain water, 2 oz. Mix it least 2 days before using, and keep your bottle well corked.

STRONG GLUE FOR INLAYING OR VENEERING.—Select the best li brown glue, free from clouds and streaks. Dissolve this in wa and to every pint add half a gill of the best vinegar and ¼ oz. isinglass.

INLAID MOTHER OF PEARL WORK, on sewing machines and ot fancy work, is performed by selecting the thin scales of the s and cementing them to the surface of the material; the rest of surface is covered with successive coats of Japan varnish, ge rally black, being subjected to a baking process after each ap cation. When the varnish is as thick as the shell, it is polish the gilding and painting added, and a flowing coat of varnish over the whole.

ANOTHER METHOD.—Prepare the job with a heavy coat of bl Japan; then, before it is dry, procure some flakes of pearl and them on the black surface, pressing them into the Japan until t are level with the surface; then with colors form vines and flow allowing the pearl to form the body of the flower or leaf, and shade up all nicely.

COMPOUND COLORS.—*Light Gray* is made by mixing white lead with lamp black, using more or less of each material, as you wish to obtain a lighter or darker shade. *Buff* is made from yellow ochre and white lead. *Silver or Pearl Gray.*—Mix white lead, Prussian blue, and a very slight portion of black, regulating the quantities you wish to obtain. *Flaxen Gray* is obtained by a mixture of white lead and Prussian blue, with a small quantity of lake. *Brick Color.*—Yellow ochre and red lead, with a little white. *Oak Wood Color.*—¾ white lead and ¼ part umber and yellow ochre, proportions of the last two ingredients being determined by the desired tints. *Walnut-tree Color.*—⅔ white lead, and ⅓ red ochre, yellow ochre, and umber, mixed according to the shade sought. If veining is required, use different shades of the same mixture, and for the deepest places, black. *Jonquil.*—Yellow, pink, and white lead. This color is only proper for distemper. *Lemon Yellow.*—Realgar and orpiment. The same color can be obtained by mixing yellow pink with Naples yellow; but it is then only fit for distemper. *Orange Color.*—Red lead and yellow ochre. *Violet Color.*—Vermilion, or red lead, mixed with black or blue, and a small portion of white. Vermilion is preferable to red lead in mixing this color. *Purple.*—Dark-red mixed with violet color. *Carnation.*—Lake and white. GOLD COLOR.—Massicot, or Naples yellow, with a small quantity of realgar, and a very little Spanish white. *Olive Color* may be obtained by black and a little blue, mixed with yellow. Yellow-pink, with a little verdigris and lampblack; also ochre and a small quantity of white will produce an olive color. For distemper, indigo and yellow-pink, mixed with white lead or Spanish white, must be used. If veined, it must be done with umber. *Lead Color.*—Prussian blue and white. *Chestnut Color.*—Red ochre and black, for a dark chestnut. To make it lighter, employ a mixture of yellow ochre. *Light Timber Color*—Spruce ochre, white, and a little umber. *Flesh Color.*—Lake, white lead, and a little vermilion. *Light Willow Green.*—White, mixed with verdigris. *Grass Green.*—Yellow-pink, mixed with verdigris. *Stone Color.*—White, with a little spruce ochre. *Dark Lead Color*—Black and white, with a little Prussian blue. *Fawn Color.*—White lead, stone ochre, with a little vermilion. *Chocolate Color.*—Lampblack and Spanish brown. On account of the fatness of lampblack, mix some litharge and red lead. *Portland Stone Color.*—Umber, yellow ochre, and white lead. *Rose Color.*—White lead and carmine or lake. *Salmon Color.*—White lead and blue, yellow, and red. *Pearl Color.*—White lead, Prussian blue, and red. *Slate Color.*—White lead, black, red and blue. *Pea Green.*—White lead and chrome, or Paris green. *Cream Color.*—White lead, yellow and red. *Straw Color.*—White lead and yellow. *Peach Blossom Color.*—White lead and vermilion. *Brown.*—Venetian red and lampblack. *Dark Green.*—Lampblack and chrome green. *Olive Color.*—Red, green, or black, yellow and red. *Snuff Color.*—Yellow, sienna, and red.

PRUSSIAN BLUE.—1st. Take nitric acid, any quantity, and as much iron shavings from the lathe as the acid will dissolve; heat the iron as hot as can be handled with the hand; then add it to the acid in small quantities as long as the acid will dissolve it; then slowly add double the quantity of soft water that there was of acid, and put in iron again as long as the acid will dissolve it. 2d. Take prussiate of potash, dissolve it in the hot water to make a strong solution, and make sufficient of it with the first to give the depth of tint desired, and the blue is made.

Another Method.—A very passable Prussian blue is made by taking sulphate of iron (copperas) and prussiate of potash, equal parts of each; and dissolving each separately in water, then mixing the two waters.

Chrome Yellow.—1st. Take sugar of lead and Paris white, of each 5 lbs.; dissolve them in hot water. 2d. Take bichromate of potash, 6½ oz.; and dissolve it in hot water also; each article to be dissolved separately; then mix all together, putting in the bichromate last. Let stand twenty-four hours.

Chrome Green.—Take Paris white, 6½ lbs.; sugar of lead, and blue vitriol, of each 3½ lbs.; alum, 10½ oz.; best soft Prussian blue and chrome yellow, of each 3½ lbs. Mix thoroughly while in fine powder, and add water, 1 gal., stirring well, and let stand three or four hours.

Green, Durable and Cheap.—Take spruce yellow, and color it with a solution of chrome yellow and Prussian blue, until you give it the shade you wish.

Another Method.—Blue vitriol, 5 lbs.; sugar of lead, 6¼ lbs.; arsenic, 2½ lbs.; bichromate of potash, 1½ oz.; mix them thoroughly in fine powder, and add water 3 parts, mixing well again, and let stand three or four hours.

Pea Brown.—1st. Take sulphate of copper any quantity, and dissolve it in hot water. 2d. Take prussiate of potash, dissolve it in hot water to make a strong. solution; mix of the two solutions, as in the blue, and the color is made.

Rose Pink.—Brazil wood, 1 lb., and boil it for two hours, having 1 gal. of water at the end; then strain it, and boil alum, 1 lb., in the same water until dissolved; when sufficiently cool to admit the hand, add muriate of tin, ¾ oz. Now have Paris white, 12½ lb.; moisten up to a salvy consistence, and when the first is cool, stir them thoroughly together. Let stand twenty-four hours.

Patent Yellow.—Common salt, 100 lbs., and litharge, 400 lbs., are ground together with water, and for some time in a gentle heat, water being added to supply the loss by evaporation; the carbonate of soda is then washed out with more water, and the white residuum heated till it acquires a fine yellow color.

Naples Yellow.—No. 1. Metallic antimony, 12 lbs.; red lead, 8 lbs.; oxide of zinc, 4 lbs. Mix, calcine, triturate well together, and fuse in a crucible: the fused mass must be ground and elutriated to a fine powder.

Cheap Yellow Paint.—Whiting, 3 cwt.; ochre, 2 cwt.; ground white lead, 25 lbs. Factitious linseed oil to grind.

Stone-Color Paint.—Road-dust, 2 cwt.; ground white lead, ½ cwt.; whiting, 1 cwt.; ground umber, 14 lbs.; lime water, 6 gals. Factitious linseed oil to grind.

Glazier's Putty.—Whiting, 70 lbs.; boiled oil, 30 lbs. Mix; *if too thin*, add more whiting; if too thick, add more oil.

Compound Colors.—*Blue.*—Grind Prussian blue in turps, other blue, very fine in linseed oil; mix with white paint to the color required. *Straw.*—A mixture of chrome yellow and white lead, oil and turps. *Steel.*—Mix ceruse, Prussian blue, fine lac, and vermilion, with oil and turps. *Purple.*—White lead, Prussian blue and vermilion, with oil and turps. *French Grey.*—White lead and Prussian blue, tinged with vermilion, and for the last coat substitute carmine or lake for vermilion. *Drab.*—White lead with a little Prussian blue and French yellow, linseed oil and turps. *Another Drab.*—White lead with a little Prussian blue and lampblack, linseed oil and turps. *Dark Red, for common purposes.*—Mix English Venetian red, in boiled oil, with a little red lead and litharge, to give a drying quality. *Lighter Red.*—Mix together equal parts of Venetian red and red lead, in boiled oil and turps. *Imitation of Vermilion.*—Grind together, in oil, red lead and rose pink. *Deep Red.*—Mix, in oil, vermilion with a dust of Venetian red, or red lead. *Unfading Orange.*—This is a mixture of orange lead (orpiment) and French or stone yellow, oil and turps. *Bright Yellow, for floors.*—White lead and linseed oil, mixed with some French yellow, and a little chrome yellow to heighten it, some red lead, burnt white vitriol and litharge, added, to give it a drying quality. This color mixed with equal parts of boiled oil and turpentine, and used very thin. *Dark Yellow.*—Mix French yellow in boiled oil, adding to it a little red lead or litharge to give the paint a drying quality. *Light Yellow.*—This is a mixture of French yellow and white lead, with oil and turpentine. *Another.*—French yellow, white lead and red lead. *Another.*—This is a mixture of Prussian blue, French yellow, a small portion of Turkey umber, and a little burnt vitriol. Ground the same way. *Another, in oil.*—Mix Prussian blue and chrome yellow. Ground the same. *Another Shade.*—A mixture of Prussian blue and French yellow, with a small quantity of white lead and Turkey umber; add burnt white vitriol, ground the same. *Another, light.*—White mixed with verdigris. A variety of shades may be obtained by using blue and yellow with white lead. *Another, olive.*—Black and blue mixed with yellow, in such quantities as to obtain the colors or shades required. For *distemper*, use indigo and yellow pink mixed with whiting or white lead powder. *Freestone color.*—A mixture of red lead, Venetian red, French yellow and lampblack, (varying the shade according to taste,) with linseed oil and turpentine. *Olive Green.*—Grind, separately, Prussian blue and French yellow, in boiled oil, then mix to the tints required with a little burnt white vitriol to act as a dryer. A cheap and handsome color for outside work, such as doors, carts, waggons, railings, &c.

Lead Color for Iron.—Take litharge and place it over a fire in a ladle; sprinkle over it flour of brimstone, to turn it dark; grind it in oil. It dries quick, and stands well in any weather.

A Good Imitation of Gold.—Mix white lead, chrome yellow and burnt sienna until the proper shade is obtained.

A Beautiful White Paint.-For inside work, which ceases to smell, and dries in a few hours. Add 1 lb. of frankincense to 2 quarts of spirits of turpentine; dissolve it over a clear fire, strain it, and bottle it for use; then add 1 pint of this mixture to 4 pints of bleached linseed oil, shake them well together, grind white lead in spirits of turpentine, and strain it; then add sufficient of the lead to make it proper for painting; if too thick in using, thin with turpentine, it being suitable for the best internal work on account of its superiority and expense.

For a pure White Paint.—Nut-oil is the best; if linseed oil is used, add one-third of turpentine.

To mix Common White Paint.—Mix or grind white lead in linseed oil to the consistency of paste; add turpentine in the proportion of one quart to the gallon of oil; but these proportions must be varied according to circumstances. Remember to strain your color for the better sorts of work. If the work is exposed to the sun, use more turpentine for the ground-color, to prevent its blistering.

Invisible Green for Outside Work.—Mix lampblack and French yellow with burnt white vitriol. These colors mix in boiled oil. Burnt vitriol is the best drier for greens, as it is powerful and colorless, and, consequently, will not injure the color.

Bright Varnish Green, for Inside Blinds, Fenders, &c.—The work must first be painted over with a light lead color, and, when dry, grind some white lead in spirits of turpentine; afterwards take about ⅓ in bulk of verdigris, which has been ground stiff in linseed oil; then mix them both together, and put into a little resin varnish, sufficient only to bind the color. When this is hard, which will be the case in 15 minutes, pour into the color some resin to give it a good gloss. Then go over the work a second time, and, if required, a third time. Thus you will have a cheap and beautiful green, with a high polish. It possesses very drying quality, as the work may be completed in a few hours. The tint may be varied according to taste, by substituting mineral green for verdigris; and if a bright grass-green is required, add a little Dutch pink to the mixture.

N.B.—This color must be used when quite warm, to give the varnish an uniform extension.

Compound Greens.—This is a mixture of whiting, indigo and Dutch pink, the intensity of which may be increased or diminished by the addition of blue or yellow. These mixtures will not admit of any fixed rules in regard to the quantities of the matters used in their composition. They must depend on the taste of the artist and the tone he is desirous of giving to the color.

Pea Green.—Take one pound of genuine mineral green, one pound of the precipitate of copper, one pound and a half of blue verditer, three pounds of white lead, three ounces of sugar of lead, and three ounces of burnt white vitriol. Mix the whole of these ingredients in linseed oil, and grind them quite fine. It will produce a bright mineral pea-green paint, preserve a blue tint and keep any length of time in any climate, without injury, by putting water over it. To use this color for house or ship painting, take one pound of the green paint with some pale boiled oil, mix them well together, and this will produce a strong pea-green paint. The tint may be altered at pleasure, by adding a proportionate quantity of white lead to the green, which may be ground in linseed oil, and thinned with spirits of turpentine for use. It may also be used for painting Venetian window blinds, by adding white lead and mixing the color with boiled oil. For all the aforesaid preparations it will retain a blue tint, which is very desirable.

FOR KNOTTING.—One pint of vegetable naptha, 1 teaspoonful of red lead, ¼ pint of japanners gold size, 7 ozs. of orange shellac, mix all together, set in a warm place to dissolve, and frequently shake.

ANOTHER.—Mix white lead, or red lead powder, in strong glue size, and apply it warm.

BEAUTIFUL COLOR FOR CARRIAGES, COACHES, &C.—Mix Victoria lake with black japan.

WHITE LEAD.—The most usual method of manufacturing white lead is that known as the Dutch method. It consists in exposing lead, cast in thin gratings, to the combined action of acetic acid moist air and carbonic acid gas. The gratings are supported a little above the bottom of earthen pots, similar to flower pots, in each of which a small quantity of weak acetic acid is placed. The pots are built up in alternate layers with spent tanners' bark, until a stack is formed, each layer of pots being covered with a board. Fermentation soon takes place in the tan, and serves the double purpose of generating heat and supplying carbonic acid. After the lapse of six or eight weeks, the metallic lead is found converted into white masses of carbonate mixed with hydrated oxide. It is then levigated, washed, dried, and ground with oil.

TO CURE DAMP WALLS.—Boil 2 ozs. of grease with 2 quarts of tar, for nearly twenty minutes, in an iron vessel, and having ready pounded glass, 1 lb.; slacked lime, 2 lbs.; well dried in an iron pot and sifted through a flour seive; add some of the lime to the tar and glass, to make it the thickness of thin paste, sufficient to cover a square foot at a time, as it hardens so quick. Apply it about an eighth of an inch thick.

TO PROTECT WOOD AND BRICK WORK FROM DAMP WEATHER.—Take 3 pecks of lime, slacked in the air, 2 pecks of wood ashes, and 1 peck of white sand. Sift them fine, and add linseed oil sufficient to use with a paint brush; thin the first coat; use it as thick as it will work for the second coat, grind it fine, or beat it in a trough, and it is a good composition.

PUTTY FOR REPAIRING BROKEN WALLS.—The best putty for walls is composed of equal parts of whiting and plaster of Paris, as it quickly hardens. The walls may be immediately colored upon it. Some painters use whiting mixed with size; but this is not good, as it rises above the surface of the walls, and shows in patches when the work is finished. Lime must not be used as a putty to repair walls, as it will destroy almost every color it comes in contact with.

INSTRUCTIONS FOR SIGN WRITING, WITH THE COLORS TO BE USED FOR THE GROUND AND LETTERS.—On an oak ground, ornamental letters, in ultramarine blue, filled in with gold and silver leaf, blocked up and shaded with burnt sienna. *Another.*—Gold letters on a white marble ground, blocked up and shaded with a transparent brown or burnt sienna. *On glass.*—Gold letters, shaded with burnt sienna. *Another.*—Gold letters, shaded with black, on a scarlet or chocolate ground. On a rich blue ground, gold letters, double shaded, black and white. White letters on a blue ground, shaded with black, look very well. On a purple ground, pink letters shaded with white. Mix ultramarine and vermilion for a ground color, white letters shaded with a light grey. Vermilion ground, chrome yellow, stained with vermilion and lake, for the letters, shaded black. A substitute for the above colors: Rose pink and red lead; and for the letters, stone yellow, white lead and Venetian red. A good substitute for gold is obtained by grinding white lead, chrome yellow, and a dust of vermilion together. Mix your colors for writing in boiled oil, and use for drier gold size. Other good grounds for gold letters are: blues, vermilion, lake, and Saxon. When your sign is ready for gilding, follow the directions given under the head of "To Gild Letters on Wood."

TO GIVE LUSTRE TO A LIGHT BLUE GROUND.—After the letters are written and dry, paint the ground over again, between the letters, with the same color, and while wet take pulverized Prussian blue and sift over the surface; glass, frost, or smalts may be used instead of or with the blue. When dry, brush off the loose particles.

TO REMOVE OLD PAINT.—Sal soda, 2 lbs.; lime, ¼ lb.; *hot* water, 1 gal.; rummage all together and apply to the old paint while warm. It will soon loosen the paint so that you can easily remove it. Another simple method is to sponge over your old paint with benzine, set it on fire, and you can then flake off the paint as quick as you like. Do not attempt to go over too much surface at a time, otherwise you might get more to do than you can attend to.

REFUSE PAINT AND PAINT SKINS.—Dissolve sal soda, ½ lb., in rain water, 1 gal.; cover the refuse paint for 2 days, then heat it, adding oil to reduce it to a proper consistence for painting and straining.

SOLUBLE GLASS can be made on a small scale by fusing together in a crucible, 15 parts of sand with 8 parts carbonate of soda and 1 part charcoal, not soluble in cold water, but dissolves in boiling water, yielding a strongly alkaline liquor.

BLACK WALNUT STAIN.—Spirits of turpentine, 1 gal.; pulverized asphaltum, 2 lbs.; dissolve in an iron kettle on a stove, stirring constantly. Can be used over a red stain to imitate rosewood. To make a perfect black add a little lampblack. The addition of a little varnish with the turpentine improves it.

CRYSTAL VARNISH, FOR MAPS, &c.—Canada balsam, 1 oz.; spirits of turpentine, 2 ozs.; mix together. Before applying this varnish to a drawing or colored print, the paper should be placed on a stretcher, and sized with a thin solution of isinglass in water, and dried. Apply with a soft camels-hair brush.

TO EBONIZE WOOD.—Mix up a strong stain of copperas and logwood, to which add powdered nut-gall. Stain your wood with this solution, dry, rub down well, oil, then use French polish made tolerably dark with indigo or finely powdered stone blue.

TO PAINT IN IMITATION OF GROUND GLASS.—Grind and mix white lead in three-fourths of boiled oil and one-fourth spirits of turpentine, and to give the mixture a very drying quality, add sufficient quantities of burnt white vitriol and sugar of lead. The color must be exceedingly thin, and put on the panes of glass with a large sized paint brush in as even a manner as possible. When a number of the panes are thus painted, take a dry duster quite new, dab the ends of the bristles on the glass in quick succession, till you give it an uniform appearance. Repeat this operation till the work appears very soft, and it will then appear like ground glass. When the glass requires fresh painting, get the old coat off first by using strong pearl-ash water.

Another Method.—Spirits of salts, 2 ozs.; oil of vitriol, 2 ozs.; sulphate of copper, 1 oz.; gum arabic, 1 oz.; mix all well together, and dab on the glass with a brush.

Another.—Dab your squares regularly over with putty; when dry, go over them again; the imitation will be complete.

Painting on Glass.—Take clear rosin, 1 oz., melt in an iron vessel. When all is melted, let it cool a little, but not harden; then add oil of turpentine sufficient to keep it in a liquid state. When cold, use it with colors ground in oil.

Hard Drying Paint.—Grind Venetian red, or any other color you wish, in boiled oil; then thin it with black japan. It will dry very hard for counter tops, &c.

Spirit Graining for Oak.—Two pounds of whiting, quarter of a pound of gold size, thinned down with spirits of turpentine; then tinge your whiting with Vandyke brown and raw sienna, ground fine. Strike out your lights with a fitch dipped in turpentine, tinged with a little color to show the lights. If your lights do not appear clear, add a little more turpentine. Turpentine varnish is a good substitute for the above mentioned. This kind of graining must be brushed over with beer, with a clean brush, before varnishing. Strong beer must be used for glazing up top-graining and shading.

Oil for Graining Oak.—Grind Vandyke brown in turpentine, add as much gold size as will set it, and as much soft soap as will make it stand the comb. Should it set too quickly, add a little boiled oil. Put a teaspoonful of gold size to half a pint of turpentine, and as much soap as will lie on a twenty-five cent piece, then take a little soda mixed with water and take out the veins.

To prepare the Ground for Oak Rollers.—Stain your white lead with raw sienna and red lead, or with chrome yellow and Venetian red; thin it with oil and turps, and strain for use. When the ground work is dry, grind in beer Vandyke brown, whiting and a little burnt sienna, for the graining color; or you may use raw sienna with a little whiting, umbers, &c.

To Imitate Old Oak.—To make an exceedingly rich color for the imitation of old oak, the ground is a composition of stone ochre or orange chrome and burnt sienna; the graining color is burnt umber or Vandyke brown, to darken it a little. Observe that the above colors must be used whether the imitation is in oil or distemper. When dry, varnish.

To Imitate Old *Oak, in Oil.*—Grind Vandyke and whiting in turpentine, add a bit of common soap to make it stand the comb, and thin it with boiled oil.

To Imitate Pollard Oak.—The ground color is prepared with a mixture of chrome yellow, vermilion, and white lead, to a rich light buff. The graining colors are Vandyke brown and small portions of raw and burnt sienna and lake ground in ale or beer. Fill a large tool with color, spread over the surface to be grained, and soften with the badger hair brush. Take a moistened sponge between the thumb and finger, and dapple round and round in kind of knobs, then soften very lightly; then draw a softener from one set of knobs to the other while wet, to form a multiplicity of grains, and finish the knots with a hair pencil, in some places in thicker clusters than others. When dry put the top grain on in a variety of directions, and varnish with turps and gold size; then glaze up with Vandyke and strong ale. To finish, varnish with copal.

To Imitate Mottled Mahogany.—The ground is prepared with the best English Venetian red, red lead, and a small portion of white lead. The graining colors are burnt sienna, ground in ale, with a small portion of Vandyke brown, sufficient to take away the fiery appearance of the sienna. Cover the surface to be grained, soften with the badger hair brush, and while wet take a mottling-roller and go over the lights a second time, in order to give a variety of shade, then blend the whole of the work with the badger softener. Put the top grain on with the same color. When dry, varnish.

To Imitate Rosewood.—Mix vermilion and a small quantity of white lead for the ground. Take rose pink, tinged with a little lampblack, or Vandyke brown, and grind very fine in oil, then take a flat graining brush, with the hairs cut away at unequal distances, and cut down the grain as if wending round a knot. When nearly dry, take a graining comb that is used for oak, and draw down the grain. This will give it the appearance of nature. When dry, varnish.

Another.—This ground color is prepared with vermilion and small quantities of white lead and crimson lake. When the ground is dry and made very smooth, take Vankyke brown, ground in oil, and with a small tool spread the color over the surface in different directions forming kind of knots. Before the work is dry, take a piece of leather, and with great freedom strike out the light veins; having previously prepared the darkest tint of Vandyke brown, or gum asphaltum, immediately take the flat graining brush with few hairs in it, draw the grain over the work and soften, When varnished the imitation will be excellent.

Another Rosewood Imitation in Size.—Mix Venetian red, white lead powder, vermilion and common size, the consistency of which, when cold, must be that of a weak trembling jelly. With this composition paint the work twice over. When the ground is dry, take some lamp black, finely ground in beer, and beat the white of an egg into it, take the flat graining brush, dipped in the black, and put on the grain. When dry, stain the first coat of varnish with rose pink, finely ground in turpentine, and finish the work by giving it a coat of clear varnish.

To Imitate Bird's eye Maple.—The ground is a light buff, prepared with white lead, chrome yellow, and a little vermilion or English Venetian red, to take off the rawness of the yellow. The graining color is equal parts of raw umber and sienna ground in oil to the proper consistency. Spread the surface of the work with this color, and, having some of the same prepared a little thicker, immediately take a sash tool or sponge, and put on the dark shades, and soften with the badgers hair brush; before the color is dry put on the eyes by dabbing the dotting machine on the work. When dry, put on the grain with the camels-hair pencil on the prominent parts, to imitate the small hearts of the wood. When dry, varnish.

To Imitate Curled Maple.—Prepare a light yellow for the ground, by mixing chrome yellow and white lead, tinged with Venetian red. The graining color is a mixture of equal portions of raw sienna and Vandyke, ground in ale, spread the surface to be grained in an even manner; then with a piece of cork rub across the work to and fro, to form the grains which run across the wood; soften and, when dry, lightly top-grain with the same color. When dry, varnish.

Curled Maple in Oil for Outside Work.—Prepare a rich ground by mixing chrome yellow, white lead and burnt sienna. For the graining color, grind equal parts of raw sienna and umber, with a little burnt copperas in turpentine, and mix with it a small quantity of grainers cream. Thin the color with boiled oil; then fill a tool and spread the surface even, and rub out the lights with the sharp edge of a piece of buff leather, which must now and then be wiped to keep it clean; soften the edges of the work very lightly, and when dry, put on the top grain with burnt umber and raw sienna, ground in ale, with the white of an egg beat into it. When dry varnish.

Satinwood.—This ground is prepared with white lead, stone-ochre, and small quantities of chrome yellow and burnt sienna. The graining color is one-third of raw sienna and whiting, ground in pale ale, very thin; then spread the color over the surface to be grained. While wet, soften, and have ready a wet roller or mottling brush, in order to take out the lights; blend the whole with the badger hair brush. When the work is dry, take the flat brush, and with the same color, put on the top grain. When dry, varnish.

To Imitate Yew Tree.—The ground is a reddish buff. For the graining color grind in ale equal portions of vandyke brown and burnt sienna, with a small quantity of raw sienna. When the ground is dry, spread the surface even with the color, and soften; then with a piece of cork with a sharp edge, rub the work cross and cross in order to form the fine grain, as in curled maple, and soften the same way of the grain. When dry, dip the tip of your fingers in the graining color to form the eyes or knots, and put in the small touches with a camels-hair pencil. When dry, put on the top grain, and when this is dry, varnish.

To imitate Black and Gold Marble.—This description of marble is now in great demand. The ground is a deep jet black, or a dead color, in gold size, drop black and turps ; second coat, black japan. Commence veining ; mix white and yellow ochre with a small quantity of vermilion to give a gold tinge ; dip the pencil in this color, and dab on the ground with great freedom some large patches, from which small threads must be drawn in various directions. In the deepest parts of the black, a white vein is sometimes seen running with a great number of small veins attached to it ; but care must be taken that these threads are connected with, and run in some degree in the same direction with the thicker veins. If durability is not an object, and the work is required in a short time, it may be executed very quick in distemper colors, and when varnished, it will look well.

Red Marble.—For the ground, put on a white tinged with lake or vermilion ; then apply deep rich reds in patches, filling up the intermediate spaces with brown and white mixed in oil ; then blend them together ; if in quick drying colors, use about half turps and gold size. When dry, varnish ; and while the varnish is wet, put in a multitude of fine white threads, crossing the whole work in all directions, as the wet varnish brings the pencil to a fine point.

Jasper Marble.—Put on a white ground lightly tinged with blue ; then put on patches of rich reds or rose pink, leaving spaces of the white grounds ; then partly cover those spaces with various browns to form fossils, in places running veins ; then put in a few spots of white in the centre of some of the red patches, and leaving in places masses nearly all white. When dry, use the clearest varnish.

Blue and Gold Marble.—For the ground put on a light blue ; then lake blue, with a small piece of white lead and some dark common blue, and dab on the ground on patches, leaving portions of the ground to shine between ; then blend the edges together with a duster or softener; afterwards draw on some white veins in every direction, leaving large open spaces to be filled up with a pale yellow or gold-paint ; finish with some fine white running threads, and a coat of varnish at last.

To imitate Granite.—For the ground color, stain your white lead to a light lead color, with lamp black and a little rose pink. Throw on black spots, with a graniting machine, a pale red, and fill up with white before the ground is dry.

Another.—A black ground, when half dry, throw in vermilion, a deep yellow and white spots.

To imitate Hair Wood.—For the ground-color, take white lead and thin it with turpentine, and slightly stain it with equal quantities of Prussian blue and lamp black. For the graining color, grind in ale a mixture of Prussian blue and raw sienna ; when the ground is dry, spread a transparent coat of the graining color on the surface of the work, and soften ; then with the cork, mottle by rubbing it to and fro across the work to form the fine long grain or mottle. When this is done, soften and top grain in a wavy but perpendicular directions ; varnish when dry.

Substitute for White Lead.—Sulphate of barytes ground in oil and applied like paint It can also be used to reduce white lead to any desired extent.

Paint for Black Boards in Schools.—Common glue, 4 oz.; flour of emery, 3 oz.; and just lampblack enough to give an inky color to the preparation. Dissolve the glue in ¾ qt. of warm water, put in the lampblack and emery, stir till there are no lumps, then apply to the board with a woollen rag smoothly rolled. Three coats are amply sufficient.

Compound Iron Paint.—Finely pulverized iron filings, 1 part; brick dust, 1 part; and ashes, 1 part. Pour over them glue-water or size, set the whole near the fire, and, when warm, stir them well together. With this paint cover all the wood work which may be in danger; when dry, give a second coat, and the wood will be rendered incombustible.

Best Wash for Barns and Houses.—Water lime, 1 peck; freshly slaked lime, 1 peck; yellow ochre in powder, 4 lbs.; burnt umber, 4 lbs. To be dissolved in hot water, and applied with a brush.

Durable Outside Paint.—Take 2 parts (in bulk) of water lime, ground fine; 1 part (in bulk) of white lead, in oil. Mix them thoroughly, by adding *best* boiled linseed oil, enough to prepare it to pass through a paint-mill; after which, temper with oil till it can be applied with a common paint-brush. Make any color to suit. It will last 3 times as long as lead paint. IT IS SUPERIOR.

Farmers' Paint.—Farmers will find the following profitable for house or fence paint: skim milk, two quarts; fresh slacked lime 8 oz.; linseed oil, 6 oz.; white Burgundy pitch, 2 oz.; Spanish white, 3 lbs. The lime is to be slacked in water, exposed to the air, and then mixed with about one-fourth of the milk; the oil in which the pitch is dissolved to be added, a little at a time, then the rest of the milk, and afterwards the Spanish white. This is sufficient for twenty-seven yards, 2 coats. This is for white paint. If desirable, any other color may be produced; thus, if a cream color is desired, in place of part of the Spanish white use the ochre alone.

Painting in Milk.—Skimmed milk, ½ gallon, newly slacked lime, 6 oz.; and 4 oz. of poppy, linseed, or nut oil; and 3 lbs. Spanish white. Put the lime into an earthen vessel or clean bucket; and having poured on it a sufficient quantity of milk to make it about the thickness of cream, add the oil in small quantities, a little at a time, stirring the mixture well. Then put in the rest of the milk, afterwards the Spanish white finely powdered, or any other desired color. For out-door work add 2 oz. each more of oil and slacked lime, and 2 oz. of Burgundy pitch dissolved in the oil by a gentle heat.

Premium Paint without Oil or Lead.—Slack stone-lime with boiling water in a tub or barrel to keep in the steam; then pass 6 quarts through a fine sieve. Now to this quantity add 1 quart of coarse salt, and 1 gallon of water; boil the mixture, and skim it clear To every 5 gallons of this skimmed mixture, add 1 lb. alum; ½ lb. copperas; and by slow degrees ¾ lb. potash, and 4 quarts sifted ashes or fine sand; add any coloring desired. *A more durable paint was never made.*

Green Paint for Garden Stands, Blinds, etc.— Take mineral green, and white lead ground in turpentine; mix up the quantity you wish with a small quantity of turpentine varnish. This serves for the first coat. For the second, put as much varnish in your mixture as will produce a good gloss. If you desire a brighter green, add a little Prussian blue, which will much improve the color.

Milk Paint, for Barns, any Color.—Mix water lime with skim milk, to a proper consistence to apply with a brush, and it is ready to use. It will adhere well to wood, whether smooth or rough, to brick, mortar, or stone, where oil has not been used (in which case it cleaves to some extent), and forms a very hard substance, as durable as the best oil paint. It is too cheap to estimate, and any one can put it on who can use a brush. Any color may be given to it, by using colors of the tinge desired. If a red is preferred, mix Venetian-red with milk, not using any lime. It looks well for fifteen years.

Paint.—To Make without Lead or Oil.—Whiting, 5 lbs.; skimmed milk, 2 qts.; fresh slacked lime, 2 oz. Put the lime into a stoneware vessel, pour upon it a sufficient quantity of the milk to make a mixture resembling cream; the balance of the milk is then to be added; and lastly, the whiting is to be crumbled upon the surface of the fluid, in which it gradually sinks. At this period it must be well stirred in or ground, as you would other paint, and it is fit for use.

Transparent Painting on Window Shades.—The muslin is spread on a frame and secured tightly with tacks, then sized with a mixture of fine flour paste, white glue, and white bar soap; the soap renders the muslin pliable and soft. A thin coat is applied, which is nearly invisible when dry. A coat of pure linseed oil, diluted with spirits of turpentine, is then applied to the whole, or a part, as desired; lay it on quickly and smoothly, to ensure an even transparent surface. The colors used are, ivory black, ultramarine, Paris green, sienna, umber, verdigris, asphaltum, or other suitable colors. An outline of the design is drawn with a small pencil with black or umber, after which the colors may be applied, more or less diluted, as more or less transparency is desired. In general, the brightest colors should be applied first, and the darker shades over them. These colors must be laid evenly and smoothly with soft brushes, and should any part be made too dark, the best way is to scrape off with a stick before the color gets too dry. The best designs for shades consist of landscape views, and should always be designed to accommodate the form and position of the ground on which they are drawn. Stencils will be found useful on this work, in making corners or stripes for borders.

To use Smalts.—For a gold lettered sign, lay out on a lead color or white surface the line of letters, and roughly size the shape of each letter with *fat oil size*. This must be allowed at least 12 hours to get tacky and ready for gilding. After the gold leaf is laid and perfectly dry, mix up (for blue smalts) Prussian blue and keg lead with oil, adding a little dryer. Outline carefully around the letters, and fill up all the outside with blue paint; then with a small sieve sift on the smalts, allowing the sign to lay horizontally. Cover every part with plenty of smalts, and allow it to n unmolested until the paint is dry. Then carefully shake e surplus smalts, and the work is done.

Paint Magic Lantern Slides.—Transparent colors only are for this work, such as lakes, sap-green, ultramarine, verdigris, oge, asphaltum, &c., mixed in oil, and tempered with light ed varnish (white Demar). Draw on the paper the design ed, and stick it to the glass with water or gum; then with a fine l put the outlines on the opposite side of the glass with the r colors; then shade or fill up with black or vandyke brown, u find best.

ver Polish Kalsomine.—Take 7 lbs. of Paris white and ¼ lb. ht colored glue. Set the glue in a tin vessel containing 3 pts. ter; let it stand overnight to soak. Then put it in a kettle iling water over the fire, stirring till it is well dissolved and thin. Then, after putting the Paris white into a large water- pour on hot water and stir it till it appears like thick milk. mingle the glue liquid with the whiting, stir it thoroughly apply with a whitewash-brush, or a large paint brush.

rine Paint for Metals in Salt Water.—Red lead, 55 parts; silver, 30 parts; thick turpentine, 7 parts. Mix with boiled ed oil to the proper consistency. The quicksilver must be ughly amalgamated with the thick turpentine by grinding or ing, and this mixture must be ground with the red lead and boiled oil. As little oil as is necessary to make the paint lay must be used. To make the paint adhere more firmly, a ious coat of oxide of iron paint may be used.

Imitate Tortoise Shell.—Paint a ground of salmon color; when dry and smoothed off, coat it over with rose pink, mixed rnish and turpentine; then with a flat piece of glass, press on urface, and remove the glass quickly, being careful not to it over the paints so as to disturb the curious figures which ressure will form thereon. Varnish when dry, and you will you have a beautiful imitation of tortoise shell.

nner Painting.—Lay out the letters very accurately with coal or crayon, then saturate the cloth with water to render the ting easy. On large work a stencil will be found useful. Take ce of tin, lay the straight edge to the mark, brush over with a tool, and by this means you will make a very clean-edged r. Use stiff bristle pencils in painting on canvas.

l Cloth Painting.—To paint canvas for floors, the canvas ld first be saturated with glue-water or flour paste, and ved to dry first. Then paint it with any color desired. To n the figures, cut out designs in tin plates or stiff paper, and il them on in various colors.

Imitate Marble.—*For white marble*, get up a pure white nd, then hold a lighted candle near the surface, and allow the ke to form the shades and various tints desired. This will e a very handsome imitation. *Black* marble imitation is made treaking a black surface with colors, using a feather and pencil. ther plan is to get up a smooth black surface; then take the rs, green, yellow, red, white, &c., ground thick in gold size, streak the surface with a stick or pencil. Allow it to dry, and y a heavy coat of lampblack and yellow ochre, mixed with

rough stuff. When all is hard, rub down to a level surface
lump pumice stone; varnish, and a beautiful variegated marble
be the result.

Gilding and Ornamenting Carriages.—English gold size is
best for this purpose. If you cannot get it ready prepared, ma
substitute by using English varnish and japan in equal parts.
the gilding is for striping, you should mix a little chrome yel
with it, to be able to see the lines the better, but for letterin
coloring is required. Rub your job down smoothly, take a piec
muslin and tie up in it a little whitening to form a " pounce b
with this dust over every part of the work where the gold leaf
be put, to prevent the leaf sticking to the surface not covere
the size, or wash the job over with starch water, or rub it over
the raw surface of a potatoe cut in halves; the juice of the pot
soon dries, and leaves a thin film to which the gold will not adh
Either of the above methods will do, and the coating will was
when the gilding is dry. The surface prepared, take the size
put on the stripes, figures, or ornaments, and allow it to dry
enough to enable you to pass your finger over it without stick
but if it is " tacky" when you place your finger upon it, i
ready for the gold leaf, which is to be applied in the way dire
for gilding letters on wood. The gold letters may be shaded
ultramarine, carmine, asphaltum, lake, Paris green verdigris,
to suit the taste.

Bronzing.—Gold bronze is used on carriage parts for stri
and ornamenting, using the same size as that used for gold
For taking up and applying the bronze, take a piece of plus
velvet and make a " pounce bag, " by tying up a wad of cot
rubbing the bronze gently over the size. To vary the appeara
a mixture of copper, gold, and silver bronze may be applied.
fancy work in bronze, cut out any desired pattern on thin sheet b
pasteboard, or paper, and apply it to any nearly dry varnis
surface; rub the bronze on through the apertures in the
tern.

Good Colors for Business Waggons.—No. 1. *Body.*—Chr
green; frame or ribs, black, striped with white or cream c
Running gear.—Cream color, striped with red, blue or dark gr
or black, and red fine line. No. 2. *Body.*—Yellow; frame bl
striped with blue or white. *Running gear.*—Light vermilion, str
with black and white. No. 3. *Body.*—Carmine glaze over In
red. *Running gear.*—Vermilion. No. 4. *Body.*—Deep vermil
Running gear.—Light vermilion.

Mixture to remove old Paint.—Dissolve 1 lb. potash in 3
water over the fire, then add yellow ochre or some common
paint until it is as thick as rough stuff; spread this over your
paint, and after a little it will come off quite easily, then wash
wood with soap and water to remove all the potash, dry off
sand-paper, then give a coat of clean raw oil. Another method
heat a heavy piece of iron and apply to the paint, which will c
it to become loose and soft, so that it may be scraped off wi
knife. Still another method is to direct the flame of a spirit l
(which may be constructed for the purpose) on the old p
scraping it off as it softens.

To Bleach Oil.—Pour as much linseed oil into a shallow earthen vessel as will stand one inch deep, then pour in 6 inches of water, cover with a fine cloth, and let the whole stand in the sun for a few weeks until the liquid becomes thick, when it should be poured into a phial and submitted to a gentle heat; after which the clear is to be poured off and strained through a flannel cloth.

To Copy an Ornament.—Place the paper or other article containing the ornament against a pane of glass; then laying a sheet of thin paper over it, you can copy it exactly with a lead pencil.

Ornaments, in the shape of decalcomine or other gilded pictures, may be easily transferred to carriages or coaches by following the directions given in transferring pictures to glass.

Vermilion.—To prevent vermilion from fading, add to the dry color, before mixing, ¼ part of flour of sulphur. Light English vermilion is used for striping, ornamenting or lettering; the deep vermilion having less body will not cover good. English vermilion gives the best color on carriage work when mixed with rubbing varnish and oil. American vermilion should not be ground as the process would change it to an orange color; while green, Indian red, chrome-yellow, and all heavy body colors are all the better for being ground as fine as possible. Raw oil is preferable to boiled, as it is more volatile, and penetrates and fills the pores of the wood better.

Priming for Carriage Work.—*First coat of lead.* Mix white lead with raw oil, 2 parts, japan, 1 part, to make it proper for a thick coat, adding a very little turpentine to make it work easily. For carriage parts add a little Indian black, but not for bodies. *Second coat of lead.* Mix white lead with 1 part raw oil and 2 parts japan, and a little turpentine, as before, adding lampblack for carriage parts, but none for the body. *Third and fourth coat.* Mix white lead into a thick paste with turpentine, add a little oil, japan and rubbing varnish to bind the paint well; add, for the carriage parts, a little lampblack and a little red lead.

Hard drying Putty.—*For carriage work.*—Mix dry white lead with japan and rubbing varnish equal parts, to the proper consistency, beating it with a small mallet to bruise the lumps. Keep it, when not in use, in water, to prevent it drying.

Rough Stuff.—*For carriage work.*—Take 3 parts of English filling (ground state), 2 parts dry white lead, 1 part white lead in oil. Mix with japan, 2 parts, rubbing varnish, 1 part. Mix and crush thoroughly by running all through the mill together.

Facing Lead for Carriage Work.—Mix dry white lead with 2 parts japan, 1 part rubbing varnish, and thin with spirits of turpentine, adding a little lampblack to make a clean lead color, and run all through the mill.

Coach Painting.—The panels of such work are generally painted in color, while the pillars, top strip, quarters, deck, &c., are always black; umber colors, lakes, greens, and blues are some of the best colors used on this work. To prepare the body for any of these colors, a *ground* color is used in the place of lampblack on black work. The following are a few approved *grounds.* *Lake.*—Indian red and vermilion mixed to a dark brown, but some prefer a black ground for lake. *Ultramarine.*—Mix a medium blue with white lead and Prussian blue. *Vermilion.*—A light pink color is generally used as a ground for vermilion. *Green.*—Green and all heavy-bodied colors will cover well on the lead colors without any ground color.

FISH-OIL PAINTS.—Dissolve white vitriol and litharge, of each 14 lbs., in vinegar, 32 gals.; add whale, seal, or cod oil, 1 tun, and boil to dryness, continually stirring during the ebullition. The next day, decant the clear portion; add linseed oil, 12 gals.; oil of turpentine, 3 gals., and mix well together. The sediment left is well agitated with half its quantity of lime-water, used for some inferior paints under the name of "*prepared residue oil.*" This oil is used for various common purposes, as a substitute for linseed oil, of which the following paints are examples:—*Pale Green.*—Lime-water, 6 gals.; whiting and road-dust, of each, 1 cwt.; blue-black, 30 lbs.; yellow ochre, 28 lbs.; wet blue (previously ground in *prepared residue* oil), 20 lbs.; grind well together. For use, thin with equal parts of *prepared residue oil* and linseed-oil. 2. *Bright Green.*—Yellow ochre and wet blue, of each, 1 cwt.; road-dust, 1½ cwt.; blue-black, 10 lbs.; lime water, 6 gals.; prepared fish-oil, 4 gals.; prepared residue and linseed oils, of each, 7½ gals. 3. *Lead Color.*—Whiting, 1 cwt.; blue black, 7 lbs.; white lead (ground in oil), 28 lbs.; road-dust, 56 lbs.; lime water, 5 gals.; prepared residue oil, 2½ gals. 4. *Reddish Brown.*—Lime-water, 8 gals.; Spanish-brown, 1 cwt.; road-dust, 2 cwt.; prepared fish, prepared residue and linseed oils, of each, 4 gals. 5. *Yellow.*—Substitute ochre for Spanish-brown in the last receipt. 6. *Black.*—Substitute lamp or blue black for Spanish-brown in No. 4. 7. *Stone Color.*—Lime-water, 4 gals.; whiting, 1 cwt.; white-lead (ground in oil), 28 lbs.; road-dust, 56 lbs.; prepared fish, linseed, and prepared residue oils, of each, 3 gals. 8. *Chocolate.*—No. 4 and 6 mixed together so as to form a chocolate-color. *Remarks.*—All the above paints require a little "drier." They are well fitted, by their cheapness, hardness, and durability, for common out-door work.

PORCELAIN FINISH, VERY HARD AND WHITE, FOR PARLORS.—To prepare the wood for the finish, if it be pine, give one or two coats of the "Varnish—Transparent for Wood," which prevents the pitch from oozing out, causing the finish to turn yellow; next, give the room at least four coats of pure zinc, which may be ground in only sufficient oil to enable it to grind properly; then mix to a proper consistence with turpentine or naphtha. Give each coat time to dry. When it is dry and hard, sand-paper it to a perfectly smooth surface, when it is ready to receive the finish, which consists of two coats of French zinc ground in, and thinned with Demar-varnish, until it works properly under the brush.

JAPAN DRIER, BEST QUALITY.—Take linseed oil, 1 gal.; put into it gum shellac, ¾ lb.; litharge and burned Turkey umber, each ½ lb.; red lead, ½ lb.; sugar of lead, 6 oz. Boil in the oil till all are dissolved, which will require about four hours; remove from the fire, and stir in spirits of turpentine, 1 gal., and it is done.

ANOTHER.—Linseed oil, 5 gals.; add red lead and litharge, each 3½ lbs.; raw umber, 1¼ lbs.; sugar of lead and sulphate of zinc, each, ½ lb.; pulverize all the articles together, and boil in the oil *till dissolved;* when a little cool, thin with turpentine, 5 gals.

Drying Oil equal to Patent Driers at One Quarter their Price.—Linseed oil, 2 gals.; red lead and umber, each, 4 oz.; sulphate of zinc, 2 oz.; sugar of lead, 2 oz. Boil until it will scorch a feather, when it is ready for use.

Prepared Oil for Carriages, &c.—To 1 gal. linseed oil add 2 lbs. gum shellac; litharge, ½ lb.; red lead, ¼ lb.; umber, 1 oz. Boil slowly as usual until the gums are dissolved; grind your paints in this (any color), and reduce with turpentine. Yellow ochre is used in floor painting.

Drying Oils.—1. Nut or linseed oil, 1 gal.; litharge, 12 oz.; sugar of lead and white vitriol, of each 1 oz.; simmer and skim until a pellicle forms; cool, and, when settled, decant the clear. 2. Oil 1 gal.; litharge, 12 to 16 oz.; as last. 3. Old nut or linseed oil, 1 pint; litharge, 3 oz. Mix; agitate occasionally for 10 days; then decant the clear. 4. Nut oil and water, of each 2 lbs.; white vitriol, 2 oz.; boil to dryness. 5. Mix oil with powdered snow or ice, and keep it for 2 months without thawing.

To reduce Oil Paint with Water.—Take 8 lbs. of pure unslacked lime, add 12 qts. water, stir it and let it settle, turn it off gently and bottle it, keep it corked till used. This will mix with oil, and in proportion of half will render paint more durable.

Oil Paint.—To reduce with Water.—Gum shellac, 1 lb.; sal-soda, ¼ lb.; water, 3 parts; boil all together in a kettle, stirring till dissolved. If it does not all dissolve, add a little more sal-soda; when cool, bottle for use; mix up 2 quarts of oil paint as usual, any color desired, using no turpentine; put 1 pint of the gum shellac mixture with the oil paint when it becomes thick; it can then be reduced with water to a proper thickness to lay on with a brush.

Another Method.—Soft water, 1 gal.; dissolve in it pearlash, 3 oz.; bring to a boil, and slowly add shellac, 1 lb.; when cold, it is ready to be added to oil paint in equal proportions.

How to Build Gravel Houses.—This is the best building material in the world. It is four times cheaper than wood, six times cheaper than stone, and superior to either. Proportions for mixing: to eight barrows of slacked lime, well deluged with water, add 15 barrows of sand; mix these to a creamy consistency, then add 60 barrows of coarse gravel, which must be worked well and completely; you can then throw stones into this mixture, of any shape or size, up to ten inches in diameter. Form moulds for the walls of the house by fixing boards horizontally against upright standards, which must be immovably braced so that they will not yield to the immense pressure outwards as the material settles; set the standards in pairs around the building where the walls are to stand, from six to eight feet apart, and so wide that the inner space shall form the thickness of the wall. Into the moulds thus formed throw in the concrete material as fast as you choose, and the more promiscuously the better. In a short time the gravel will get as hard as the solid rock.

Flexible Paint for Canvas.—Yellow soap, 2½ lbs.; boiling water, 1¼ gals.; dissolve; grind the solution while hot with *good oil paint*, 1¼ cwt.

Painter's Cream.—Pale nut oil, 6 oz.; mastic, 1 oz.; dissolve; add of *sugar of lead ¼ oz.*, previously ground in the least possible quantity of oil; then add of water *q. s.* gradually, until it acquires the consistency of cream, working it well all the time. Used to cover the unfinished work of painters. It will wash off with water.

Paints, Different Sorts.—Blue.—Blue-black, 25 lbs.; whiting, 100 lbs.; road dust, sifted, 200 lbs.; lime-water, 12 gallons. Factitious linseed oil to grind.

White Paint.— Whiting, 500 lbs.; white lead, 400 lbs.; lime-water, 20 gallons. Factitious linseed oil to grind.

Black Paint.— Ivory or lampblack, 100 lbs.; road-dust, sifted, 200 lbs.; lime water, 18 gallons. Oil to grind.

Brown Paint.—Venetian red, or Spanish brown, 1 cwt.; red-dust, 3 cwt.; common soot, 28 lbs.; lime-water, 15 lbs. Factitious linseed oil to grind.

Paris Green.—Take unslacked lime of the best quality, slack it with hot water; then take the finest part of the powder, and add alum-water as strong as it can be made, sufficient to form a thick paste; then color it with bichromate of potash and sulphate of copper until the color suits your fancy, and dry it for use. N.B. —The sulphate of copper gives a blue tinge; the bichromate of potash, a yellow. Observe this, and you will get it right.

Beautiful Green Paint for Walls.—Take 4 lbs. Roman vitriol, and pour on it a tea-kettle full of boiling water. When dissolved, add 2 lbs. pearlash, and stir the mixture well with a stick until the effervescence ceases; then add ¼ lb. pulverized yellow arsenic, and stir the whole together. Lay it on with a paint brush; and if the wall has not been painted before, 2 or even 3 coats will be requisite. If a pea-green is required, put in less, if an apple-green, more, of the yellow arsenic. This paint does not cost the quarter of oil-paint, and looks better.

Blue Color for Ceilings, &c.—Boil slowly for 3 hours 1 lb. blue vitriol and ½ lb. of the best whiting in about 3 qts. water; stir it frequently while boiling, and also on taking it off the fire. When it has stood till quite cold, pour off the blue liquid, then mix the cake of color with good size, and use it with a plasterer's brush in the same manner as whitewash, either for walls or ceilings.

To Harden Whitewash.—To ½ pail of common whitewash add ½ pint of flour. Pour on boiling water in a sufficient quantity to thicken it. Then add 6 gals. of the lime and water, and stir well.

Whitewash that will not rub off.—Mix up half a pailful of lime and water, ready to put on the wall; then take ¼ pt. of flour, mix it up with water; then pour on it boiling water, a sufficient quantity to thicken it; then pour it while hot into the whitewash, stir all well together, and it is ready for use.

Whitewash.—The best method of making a whitewash for outside exposure is to slack a ½ bushel of lime in a barrel, add 1 lb. of common salt, ½ lb. of the sulphate of zinc, and a gallon of sweet milk.

Substitute for Plaster of Paris.—Best whitening, 2 lbs.; glue, 1 lb.; linseed oil, 1 lb. Heat all together, and stir thoroughly. Let the compound cool, and then lay it on a stone covered with powdered whitening, and beat it well till it becomes of a tough and firm consistence; then put it by for use, covering with wet cloths to keep it fresh. When wanted for use, it must be cut in pieces adapted to the size of the mould, into which it is forced by a screw press. The ornament may be fixed to the wall, picture frame, &c., with glue or white lead. It becomes in time as hard as stone itself.

Roman Cement.—Drift sand, 94 parts; unslacked lime, 12 lbs.; and 4 lbs. of the poorest cheese grated; mix well; add hot (not boiling) water to reduce to a proper consistence for plastering. Work well and quick with a thin smooth coat.

Smalt.—Roast cobalt ore to drive off the arsenic; make the residuum into a paste with oil of vitriol, and heat it to redness for an hour; powder, dissolve in water, and precipitate the oxide of iron by carbonate of potash, gradually added until a rose-colored powder begins to fall; then decant the clear, and precipitate by a solution of silicate of potash, prepared by fusing together for 5 hours a mixture of 10 parts of potash, 15 parts of finely-ground flints, and 1 part charcoal. The precipitate, when dry, may be fused and powdered very fine.

Factitious Linseed Oil.—Fish or vegetable oil, 100 gallons; acetate of lead, 7 lbs.; litharge, 7 lbs.; dissolved in vinegar, 2 gals. Well mixed with heat, then add boiled oil, 7 gallons; turpentine, 1 gallon. Again well mix.

Varnishes.—Common Oil Varnish.—Resin, 4 lbs.; bees'-wax, ½ lb.; boiled oil, 1 gallon; mix with heat; then add spirits of turpentine, 2 quarts.

Chinese Varnish.—Mastic, 2 oz.; sandarach, 2 oz.; rectified spirit 1 pt.; close the matrass with bladder, with a pin hole for the escape of vapor; heat to boiling in a sand or water bath, and when dissolved, strain through linen.

Metallic Varnish for Coach Bodies.—Asphaltum, 56 lbs.; melt, then add litharge, 9 lbs., red lead, 7 lbs. Boil, then add boiled oil, 12 gals, yellow resin, 12 lbs. Again boil until, in cooling, the mixture may be rolled into pills; then add spts. of turpentine, 30 gals.; lampblack, 7 lbs. Mix well.

Mastic Varnish.—Mastic, 1 lb.; white wax, 1 oz.; spirits turpentine, 1 gallon; reduce the gums small; then digest it with heat in a close vessel till dissolved.

Turpentine Varnish.—Resin, 1 lb.; boiled oil, 1 lb.; melt; then add turpentine, 2 lbs. Mix well.

Pale Varnish.—Pale African copal, 1 part; fuse. Then add hot pale oil, 2 parts. Boil the mixture till it is stringy; then cool a little, and add spirits of turpentine, 3 parts.

Lacquer Varnish.—A good lacquer is made by coloring lac-varnish with turmeric and annotto. Add as much of these two coloring substances to the varnish as well give the proper color; then sqeeze the varnish through a cotton cloth, when it forms lacquer.

Gold Varnish.—Digest shellac, sixteen parts gum sandarach, mastic, of each three parts; crocus, one part; gum gamboge, two parts; all bruised, with alcohol, one hundred and forty-four parts. Or, digest seedlae, sandarach, mastic, of each eight parts; gamboge, two parts; dragon's blood, one part; white turpentine, six parts; turmeric, four parts; bruised with alcohol, one hundred and twenty *parts.*

Deep Gold-Colored Lacquer.—Seed-lac, 3 oz.; turmeric, 1 oz.; dragon's blood, one-fourth ounce; alcohol, 1 pt.; digest for a week, frequently shaking; decant, and filter.

Lacquers are used upon polished metals and wood to impart the appearance of gold. If yellow is required, use turmeric, aloes, saffron or gamboge; for red, use annotto, or dragon's blood, to color. Turmeric, gamboge, and dragon's blood generally afford a sufficient range of colors.

Gold Lacquer.—Put into a clean 4 gal. tin 1 lb. of ground turmeric, 1½ oz. of gamboge, 3½ lbs. powdered gum sandarach, ¾ pound of shellac, and 2 gal. of spirits of wine. When shaken, dissolved, and strained, add 1 pint of turpentine varnish, well mixed.

Varnish for Tools.—Take tallow, 2 oz.; resin, 1 oz.; and melt together. Strain while hot, to get rid of specks which are in the resin; apply a slight coat on your tools with a brush, and it will keep off rust for any length of time.

Gold Varnish.—Turmeric, 1 dram; gamboge, 1 dram; turpentine, 2 pints; shellac, 5 oz.; sandarach, 5 oz.; dragon's blood, 8 drams; thin mastic varnish, 8 oz.; digest with occasional agitation for 14 days; then set aside to fine, and pour off the clear.

Bookbinders' Varnish.—Shellac, eight parts; gum benzoine, 3 parts; gum mastic, 2 parts; bruise, and digest in alcohol, 48 parts; oil of lavender, ½ part. Or, digest shellac, 4 parts; gum mastic, 2 parts; gum dammer and white turpentine, of each 1 part; with alcohol (95 per cent.), 28 parts.

Beautiful Pale Amber Varnish.—Amber, pale and transparent, 6 lbs.; fuse; add hot clarified linseed oil, 2 gals.; boil till it strings strongly, cool a little, and add oil of turpentine, 4 gals. This soon becomes very hard, and is the most durable of oil-varnishes. When wanted to dry quicker, drying oil may be substituted for linseed, or "driers" may be added during the cooling.

Black Coach-Varnish.—Amber, 1 lb.; fuse; add hot *drying* oil, ½ pt.; powdered black resin and Naples asphaltum, of each 3 oz. When properly incorporated and considerably cooled, add oil of turpentine, 1 pt.

Body Varnish.—Finest African copal, 8 lbs.; fuse carefully; add clarified oil, 2 gals.; boil gently for 4½ hours, or until quite stringy; cool a little, and thin with oil of turpentine, 3½ gals. *Dries slowly.*

Carriage Varnish.—Sandarach, 19 oz.; pale shellac, 9½ oz.; very pale transparent resin, 12½ oz.; turpentine, 18 oz.; 85 per cent. alcohol, 5 pts.: dissolve. Used for the internal parts of carriage, &c. Dries in ten minutes.

Cabinetmakers' Varnish.—Very pale shellac, 5 lbs.; mastic, 7 oz.; alcohol, 90 per cent. 5 or 6 pts.; dissolve in the cold with frequent stirring. Used for French polishing, &c.

Japanners' Copal Varnish.—Pale African copal, 7 lbs.; fuse; add clarified linseed oil, ½ gal.; boil five minutes, remove it into the open air, add boiling oil of turpentine, 2 gals.; mix well, strain it into the cistern, and cover it up immediately. Used to varnish furniture, and by japanners, coach-makers, &c.

Copal Varnish.—Pale hard copal, 8 lbs.; add hot and pale *drying oil, 2 gals.*; boil till it strings strongly, cool a little, and thin with hot rectified oil of turpentine, 3 gals.; and strain immediately into the store can. Very fine.

Gold Varnish of Watin, for Gilded Articles.—Gumlac in grains, gamboge, dragon's-blood, and annotto, of each 12½ oz.; saffron, 3¼ oz. Each resin must be dissolved separately in 5 pts. of 90 per cent. alcohol, and 2 separate tinctures must be made with the dragon's blood and annotto in a like quantity of spirit; and a proper proportion of each mixed together to produce the required shade.

Varnish for Plaster Casts.—White soap and white wax, each ½ oz.; water, 2 pts.; boil together in a clean vessel for a short time. This varnish is to be applied when cold with a soft brush.

Transparent Varnish for Ploughs, &c.—Best alcohol, 1 gal.; gum sandarach, 2 lbs.; gum mastic, ½ lb.; place all in a tin can which admits of being corked; cork tight, shake it frequently, occasionally placing the can in hot water. When dissolved, it is ready for use.

Fine Black Varnish for Coaches.—Melt in an iron pot, amber, 32 oz.; resin, 6 oz.; asphaltum, 6 oz.; drying linseed oil, 1 pt.; when partly cooled, add oil of turpentine, warmed, 1 pint.

Mordant Varnish.—Dissolve 1 oz. mastic, 1 oz. sandarach, ½ oz. gum gamboge, and ¼ oz. turpentine in 6 oz. spirits turpentine. One of the simplest mordants is that procured by dissolving a little honey in thick glue. It has the effect of greatly heightening the color of the gold, and the leaf sticks extremely well.

Changing Varnish.—*To imitate Gold or Silver, &c.* Put 4 oz. best gum gamboge into 32 oz. spirits of turpentine; 4 oz. dragon's blood into 32 oz. spirits of turpentine, and 1 oz. of annotto into 8 oz. spirits of turpentine. Make the 3 mixtures in different vessels. Keep them in a warm place, exposed to the sun as much as possible, for about 2 weeks, when they will be fit for use. Add together such quantities of each liquor as the nature of the color you are desirous of obtaining will point out.

Varnish, Transparent, for Wood.—Best alcohol, 1 gal.; nice gum shellac, 2½ lbs. Place the jug or bottle in a situation to keep it just a little warm, and it will dissolve quicker than if hot, or left cold.

Patent Varnish for Wood or Canvas.—Take spirits of turpentine, 1 gal.; asphaltum, 2¼ lbs.; put them into an iron kettle which will fit upon a stove, and dissolve the gum by heat. When dissolved and a little cool, add copal varnish, 1 pt.; and boiled linseed oil, 1 pt.; when cold, it is ready for use. Perhaps a little lampblack would make it a more perfect black.

Mosaic Gold Powder for Bronzing, &c.—.Melt 1 lb. tin in a crucible, add ½ lb. of purified quicksilver to it: when this is cold, it is reduced to powder, and ground, with ½ lb. sal-ammoniac and 7 oz. flour of sulphur, till the whole is thoroughly mixed. They are then calcined in a matrass; and the sublimation of the other ingredients leaves the tin converted into the mosaic gold powder which is found at the bottom of the glass. Remove any black or discolored particles. *The sal-ammoniac* used must be very white *and clear, and the mercury* of the utmost purity. When a deeper red is required, grind a very small quantity of red lead with the above materials.

True Gold Powder.—Put some gold leaf, with a little honey, or thick gum water made with gum arabic, into an earthen mortar, and pound the mixture till the gold is reduced to very small particles; then wash out the honey or gum repeatedly with warm water, and the gold in powder will be left behind. When dry, it is fit for use.

Dutch Gold Powder is made from Dutch gold leaf, which is sold in books at a very low price. Treat in the manner described above for true gold powder. When this inferior powder is used, cover the gilding with a coat of clear varnish, otherwise it will soon lose its bright appearance.

Copper Powder is prepared by dissolving filings or slips of copper with nitrous acid in a receiver. When the acid is saturated, the slips are to be removed; or, if filings be employed, the solution is to be poured off from what remains undissolved. Small bars are then put in, which will precipitate the copper powder from the saturated acid; and, the liquid being poured from the powder, this is to be washed clean off the crystals by repeated waters.

General Directions for Bronzing.—The choice of the above powders is of course determined by the degree of brilliancy you wish to obtain. The powder is mixed with strong gum water or isinglass, and laid on with a brush or pencil; and, when not so dry as to have still a certain clamminess, a piece of soft leather wrapped round the finger is dipped in the powder, and rubbed over the work. When the work has been all covered with the bronze, it must be left to dry, and any loose powder then cleared away by a hair-pencil.

The Bronzing of Plaster Casts is effected by giving them a coat of oil or size varnish, and when this is nearly dry, applying with a dabber of cotton or a camel-hair pencil any of the metallic bronze powders; or the powder may be placed in a little bag of muslin, and dusted over the surface, and afterwards finished with a wad of linen. The surface must be afterwards varnished.

Bronzing Iron.—The subject should be heated to a greater degree than the hand can bear, and German gold, mixed with a small quantity of spirit of wine varnish, spread over it with the pencil; should the iron be already polished, you must heat it well, and moisten it with a linen rag dipped in vinegar.

French Burnished Gilding.—*Encollage*, or glue coat.—To a decoction of wormwood and garlic in water, strained through a cloth, a little common salt and some vinegar are added. This is mixed with as much good glue, and the mixture spread in a hot state with a brush of boar's hair. When plaster or marble is gilded, leave out the salt. The first glue-coating is made thinner than the second. 2. *White preparation* consists in covering the above surface with 8, 10, or 12 coats of Spanish white, mixed up with strong size; each well worked on with the brush. 3. *Stop* up the pores with thick whiting and glue, and smooth the surface with dogskin. 4. *Polish* the surface with pumice-stone and very cold water. 5. *Retouch* the whole in a skilful manner. 6. *Cleanse* with a damp linen rag, and then a soft sponge. 7. Rub with a horse's tail

e-grass) the parts to be yellowed, to make them softer. 8.
w with *yellow ochre* carefully ground in water, and mixed
transparent colorless size. Use the thinner part of the mixture
a fine brush. 9. Next rub the work with shave-grass to
ve any granular appearance. 10. *Gold water size* consists of
enian bole, 1 lb.; bloodstone (hematite), 2 oz.; and as much
a, each separately ground in water. Then mix all together
a spoonful of olive-oil. This is tempered with a white sheep-
glue, clear and well strained. Heat, and apply three coats
a fine long-haired brush. 11. *Rub* with a clean dry linen
, except the parts to be burnished, which are to receive other
ts of the gold size, tempered with glue. 12. The surface,
ed with cold water (iced in summer), has then the *gold leaf*
ed to it. Gild the *hollow* ground before the more prominent
; water being dexterously applied by a soft brush, immedi-
behind the gold leaf, before laying it down; removing any
s of water with a dry brush. 13. *Burnish* with bloodstone.
ext pass a thin coat of glue, slightly warmed, over the parts
are not to be burnished. 15. Next moisten any broken points
a brush, and apply bits of gold leaf to them. 16. Apply the
il coat very lightly over the gold leaf with a soft brush. It
lustre and fire to the gold, and is made as follows: annotto,
; gamboge, 1 oz.; vermilion, 1 oz.; dragon's-blood, ½ oz.;
f tartar, 2 oz.; saffron, 18 grs.; boil in 2 English pints of
, over a slow fire, till it is reduced to a fourth; then pass the
through a silk or muslin sieve. 17. Next pass over the dead
ces a second coat of deadening glue, hotter than the first.
finishes the work, and gives it strength.

NZING OR GILDING WOOD.—Pipeclay, 2 oz.; Prussian blue,
t yellow, raw umber, lampblack, of each, 1 oz.; grind separa-
ith water on a stone, and as much of them as will make a good
put into a small vessel ¾ full of size. The wood, being pre-
ly cleaned and smoothed, and coated with a mixture of clean
and lampblack, receives a new coating twice successively
the above compound, having allowed the first to dry. After-
s the bronze powder is to be laid on with a pencil, and the
e burnished or cleaned anew, observing to repair the parts
h may be injured by this operation; next the work must be
d over with a thin layer of Castile soap, which will take the
off the burnishing, and afterwards be carefully rubbed with
ollen cloth. The superfluous powder may be rubbed off when

ONZE POWDER of a *pale gold* color is produced from an alloy of
arts of copper and 2¾ parts zinc, of a *crimson metallic* lustre,
copper, of a *paler* color, copper, and a very little zinc; *green*
ze with a proportion of verdigris, of a fine *orange* color, by
parts copper and 1¾ zinc; another orange color, 13¾ parts
er and 2¼ zinc. The alloy is laminated into very fine leaves
careful annealing, and these are levigated into impalpable
lers, along with a film of fine oil, to prevent oxidizement, and
vor the levigation.

VIVER FOR GILT FRAMES.—White of eggs, 2 oz.; chloride of
h or *soda, 1 oz.; mix well*; blow off the dust from the frames;

then go over them with a soft brush dipped in the mixture, and they will appear equal to new.

Gilding on Wood.—To gild in *oil*, the wood, after being properly smoothed, is covered with a coat of *gold size*, made of drying linseed oil mixed with yellow ochre; when this has become so dry as to adhere to the fingers without soiling them, the gold leaf is laid on with great care and dexterity, and pressed down with cotton wool; places that have been missed are covered with small pieces of gold leaf, and when the whole is dry, the ragged bits are rubbed off with the cotton. This is by far the easiest mode of gilding: any other metallic leaves may be applied in a similar manner. *Pale leaf gold* has a greenish yellow color, and is an alloy of gold with silver. Dutch gold leaf is only copper leaf colored with the fumes of zinc; being much cheaper than true gold leaf, it is very useful when large quantities of gilding are required in places where it can be defended from the weather, as it changes color if exposed to moisture; and it should be covered with varnish. *Silver leaf* is prepared every way the same as gold leaf; but when applied, should be kept well covered with varnish, otherwise it is liable to tarnish; a transparent yellow varnish will give it the appearance of gold. Whenever gold is fixed by means of linseed oil, it will bear washing off, which burnished gold will not.

To Remove Old Putty.—Apply nitric or muriatic acid.

Glass and Porcelain Gilding.—Dissolve in boiled linseed oil an equal weight either of copal or amber; add as much oil of turpentine as will enable you to apply the compound or size thus formed, as thin as possible, to the parts of the glass intended to be gilt. The glass is to be placed in a stove till it will almost burn the fingers when handled: at this temperature the size becomes adhesive, and a piece of gold-leaf, applied in the usual way, will immediately stick. Sweep off the superfluous portions of the leaf, and when quite cold it may be burnished; taking care to interpose a piece of India paper between the gold and the burnisher.

Soluble Glass.—1. Silica, 1 part; carbonate of soda, 2 parts; fuse together. 2. Carbonate of soda (dry), 54 parts; dry carbonate of potassa, 70 parts; silica, 192 parts; soluble in boiling water, yielding a fine, transparent, semi-elastic varnish. 3. Carbonate of potassa (dry), 10 parts; powdered quartz (or sand, free from iron or alumina), 15 parts; charcoal, 1 part; all fused together. Soluble in 5 or 6 times its weight of *boiling* water. The filtered solution, evaporated to dryness, yields a transparent glass, permanent in the air.

Etching on Glass.—Druggists' bottles, bar-tumblers, signs, and glassware of every description, can be lettered in a beautiful style of art, by simply giving the article to be engraved, or etched, a thin coat of the engraver's varnish (see next receipt), and the application of fluoric acid. Before doing so, the glass must be thoroughly cleaned and heated, so that it can hardly be held. The varnish is then to be applied lightly over, and made smooth by dabbing it with a small ball of silk, filled with cotton. When dry and even, *the lines* may be traced on it by a sharp steel, cutting clear *through the* varnish to the glass. The varnish must be removed n from each letter, otherwise it will be an imperfect job. When s ready, pour on or apply the fluoric acid with a feather, fill- each letter. Let it remain until it etches to the required h, then wash off with water, and remove the varnish.

rCHING VARNISH.—Take of virgin wax and asphaltum, each 2 of black pitch and Burgundy pitch, each ½ oz.; melt the wax pitch in a new earthenware glazed pot, and add to them, by rees, the asphaltum, finely powdered. Let the whole boil, sim- ing gradually, till such time as, taking a drop upon a e, it will break when it is cold, on bending it double two or e times betwixt the fingers. The varnish, being then boiled igh, must be taken off the fire, and, after it cools a little, must oured into warm water that it may work the more easily with hands, so as to be formed into balls, which must be kneaded, put into a piece of taffety for use.

LUORIC ACID, TO MAKE FOR ETCHING PURPOSES.—You can make r own fluoric (sometimes called hydro-fluoric) acid, by getting fluor or Derbyshire spar, pulverizing it, and putting all of it sulphuric acid which the acid will cut or dissolve. Inasmuch luoric acid is destructive to glass, it cannot be kept in common tles, but must be kept in lead or gutta percha bottles.

LASS-GRINDING FOR SIGNS, SHADES, &C.—After you have etched ame or other design upon uncolored glass, and wish to have it w off to better advantage by permitting the light to pass only ough the letters, you can do so by taking a piece of flat brass iciently large not to dip into the letters, but pass over them en gliding upon the surface of the glass; then, with flour of ry, and keeping it wet, you can grind the whole surface, very ckly, to look like the ground-glass globes often seen upon ps, except the letter, which is eaten below the general surface.

o DRILL AND ORNAMENT GLASS.—Glass can be easily drilled by eel drill, hardened but not drawn, and driven at a high velo- r. Holes of any size, from the 16th of an inch upwards, can be led, by using spirits of turpentine as a drip; and, easier still, using camphor with the turpentine. Do not press the glass y hard against the drill. If you require to ornament glass by ning in a lathe, use a good mill file and the turpentine and cam- r drip, and you will find it an easy matter to produce any shape choose.

ILDING GLASS SIGNS, &C.—Cut a piece of thin paper to the size your glass, draw out your design correctly in black lead-pencil the paper, then prick through the outline of the letters with a needle; tie up a little dry white lead in a piece of rag; this is a nce-bag. Place your design upon the glass, right side up, dust with the pounce-bag; and, after taking the paper off, the design l appear in white dots upon the glass; these will guide you in ing on the gold on the opposite side, which must be *well ned* preparatory to laying on the gold. *Preparing the size.*— l perfectly clean water in an enamelled saucepan, and while ling, add 2 or 3 shreds of best selected isinglass; after a few nutes strain it through a clean linen rag; when cool, it is ready use. *Clean the glass perfectly.*—When this is done, use a flat nel's-hair *brush for laying on the size*; and let it drain off when

you put the gold on. When the gold is laid on and perfectly d
take a ball of the finest cotton wool and gently rub or polish
gold; you can then lay on another coat of gold if desirable; i
now ready for writing. In doing this, mix a little of the best veg
able black with black japan; thin with turpentine to proper wo
ing consistency; apply this when thoroughly dry; wash off
superfluous gold, and shade as in sign-writing.

Glass Gilding, Another Method.—Clean and dry the gl
thoroughly, then lay out the lines for the letters with a piec
hard scented soap, then paint the letters on the *right* side of
glass with lampblack mixed with oil, in order to *form a guide*
the work, then on the inside lay on a coat of the size mentione
the preceding receipt, using a camel's-hair brush, covering
whole of the letters; next lay on the gold leaf with a tip, u
every part of the letters is covered well. Let the leaf remain u
the size is dry, when you will find that the letters on the front
can be easily seen and traced. This is done with quick dry
black, mixed with a little varnish. Paint over the whole dire
on the gold; allow it to dry; then wipe off with soap and wa
the lampblack letters from the front side, with pure cold wa
and a clean sponge; wash the superfluous gold leaf and size fr
the back, and you will have a splendid gold letter on the gl
next, shade your letters to suit the taste, always remembering
shade to the edge of the gold, for then you have only *one* edge
make straight. The other edge may be left rough, and when
may be straightened by scraping with a knife.

Ornamental Designs on Glass.—In making scrolls, eagles, &
on glass, some painters put on the outlines and shades first,
then lay the gold leaf over all; another good way is to scratch
shades into the gold leaf after it is dry, and put the colors on
back of the gold. Silver leaf may be used in the same manner
gold, but it will not wear as well. A very pretty letter may be m
by incorporating silver with gold; take paper and cut any fa
design to fit the parts of the letter; stick it on the size before l
ing the leaf, and then lay the leaf, allowing it to dry, and wash
as before; then with a penknife raise the paper figure, and
exact shape or form of the figure will be found cut out of the g
letter; clean off nicely, apply more size, and lay *silver* leaf to co
the vacant spots; wash off when dry, and a very handsome le
will be the result. Colors may be used instead of silver, if desi
or a silver letter edged or " cut up" with gold, will look well.

Gilders' Gold Size.—Drying or boiled linseed oil, thicke
with yellow ochre, or calcined red ochre, and carefully reduced
the utmost smoothness by grinding. It is thinned with oil of t
pentine.

To Gild Letters on Wood, &c.—When your sign is prepared
smooth as possible, go over it with a sizing made by white of
egg dissolved in about four times its weight of cold water; add
a small quantity of fuller's earth, this to prevent the gold stick
to any part but the letters. When dry, set out the letters
commence writing, laying on the size as thinly as possible, wit
sable pencil. Let it stand until you can barely feel a slight stic
ness, then go to work with your gold leaf, knife, and cushion,

gild the letters. Take a leaf up on the point of your knife, after giving it a slight puff into the back part of your cushion, and spread it on the front part of the cushion as straight as possible, giving it another slight puff with your mouth to flatten it out. Now cut it into the proper size, cutting with the heel of your knife forwards. Now rub the tip lightly on your hair; take up the gold on the point, and place it neatly on the letters; when they are all covered get some very fine cotton wool, and gently rub the gold until it is smooth and bright. Then wash the sign with clean water to take off the egg size.

Substitute for Plaster of Paris.—Best whitening, 2 lbs.; glue, 1 lb.; linseed oil, 1 lb. Heat all together, and stir thoroughly, Let the compound cool, and then lay it on a stone covered with powdered whitening, and heat it well till it becomes of a tough and firm consistence; then put it by for use, covering with wet cloths to keep it fresh. When wanted for use, it must be cut in pieces adapted to the size of the mould, into which it is forced by a screw press. The ornament may be fixed to the wall, picture-frame, &c., with glue or white lead. It becomes in time as hard as stone itself.

Gold Lustre for Stoneware, China, &c.—Gold, 6 parts; aqua regia, 36 parts. Dissolve, then add tin, 1 part; next add balsam of sulphur, 3 parts; oil of turpentine, 1 part. Mix gradually into a mortar, and rub it until the mixture becomes hard; then add oil of turpentine, 4 parts. It is then to be applied to a ground prepared for the purpose.

Gilding China and Glass.—Powdered gold is mixed with borax and gum-water, and the solution applied with a camel-hair pencil. Heat is then applied by a stove until the borax fuses, when the gold is fixed and afterwards burnished.

Glass Staining.—The following colors, after having been prepared, and rubbed upon a plate of ground-glass, with the spirit of turpentine or lavender thickened in the air, are applied with a hair-pencil. Before using them, however, it is necessary to try them on small pieces of glass, and expose them to the fire, to ascertain if the desired tone of color is produced. The artist must be guided by these proof-pieces in using his colors. The glass proper for receiving these pigments should be colorless, uniform, and difficult of fusion. A design must be drawn on paper, and placed beneath the plate of glass. The upper side of the glass, being sponged over with gum-water, affords, when dry, a surface proper for receiving the colors without the risk of their running irregularly, as they would otherwise do on the slippery glass. The artist draws on the plate (usually in black), with a fine pencil, all the traces which mark the great outlines or shades of the figures. Afterwards, when it is dry, the vitrifying colors are laid on by means of larger hair-pencils; their selection being regulated by the burnt specimen-tints above mentioned. The following are all fast colors, which do not run, except the yellow, which must therefore be laid on the opposite side of the glass. The preparations being all laid on, the glass is ready for being fired in a muffle, in order to fix and bring out the proper colors. The muffle must be made of very *refractory fire-clay*, flat at its bottom, and only five or six inches high, with a strong arched roof, and close on all sides, to exclude smoke and flame. On the bottom, a smooth bed of sifted lime, freed from water, about half an inch thick, must be prepared for receiving the glass. Sometimes, several plates of glass are laid over each other, with a layer of lime powder between each. The fire is now lighted, and very gradually raised, lest the glass should be broken; then keep it at a full heat for three or four hours, more or less, according to the indications of the trial slips; the yellow coloring being principally watched, it furnishing the best criterion of the state of the others. When all is right, let the fire die out, so as to anneal the glass.

STAINED-GLASS PIGMENTS.—No. 1. *Flesh-color.*—Red lead, 1 oz.; red enamel (Venetian glass enamel, from alum and copperas calcined together): grind them to a fine powder, and work this up with alcohol upon a hard stone. When slightly baked, this produces a fine flesh-color. No. 2. *Black color.*—Take 14½ oz. of smithy scales of iron; mix them with 2 oz. of white glass; antimony, 1 oz.; manganese, ½ oz.; pound and grind these ingredients together with strong vinegar. No. 3. *Brown color.*—White glass or enamel, 1 oz.; good manganese, ½ oz.; grind together. No. 4. *Red, Rose, and Brown colors* are made from peroxide of iron, prepared by nitric acid. The flux consists of borax, sand, and minium, in small quantities. *Red color* may likewise be obtained from 1 oz. of red chalk, pounded, mixed with 2 oz. of white, hard enamel, and a little peroxide of copper. A *red* may also be composed of rust of iron, glass of antimony, yellow glass of lead, such as is used by potters, or litharge, each in equal quantities, to which a little sulphuret of silver is added. This composition, well ground, produces a very fine red color on glass. No. 5. *Green.*—2 oz. of brass, calcined into an oxide; 2 oz. of minium, and 8 oz. of white sand; reduce them to a fine powder, which is to be enclosed in a well-luted crucible, and heated strongly in an air furnace for an hour. When the mixture is cold, grind it in a brass mortar. Green may, however, be advantageously produced, by a yellow on one side and a blue on the other. Oxide of chrome has been also employed to stain glass green. No. 6. A *fine Yellow stain.*—Take fine silver, laminated thin, dissolve in nitric acid, dilute with abundance of water, and precipitate with solution of sea-salt; mix this chloride of silver in a dry powder, with three times its weight of pipe clay, well burnt and pounded. The back of the glass pane is to be painted with this powder; for, when painted on the face, it is apt to run into the other colors. A *pale yellow* can be made by mixing sulphuret of silver with glass of antimony and yellow ochre, previously calcined to a red brown tint. Work all these powders together, and paint on the back of the glass. Or silver *laminæ*, melted with sulphur and glass of antimony, thrown into cold water and afterwards ground to powder, afford a yellow. A *pale yellow* may be made with the powder resulting from brass, sulphur, and glass of antimony, calcined together in a crucible till they cease to smoke, and then mixed with a little burnt yellow ochre. The *fine yellow* of M. Meraud is prepared from chloride of silver, oxide of zinc, and rust of iron. This mixture, simply ground, is applied on the glass. *Orange color.—Take* part of silver powder, as precipitated from the nitrate of that metal, by plates of copper, and washed; mix with 1 part of red ochre, and 1 of yellow, by careful trituration; grind into a thin pap, with oil of turpentine or lavender; apply this with a brush, and burn in.

Silvering Looking-Glasses with Pure Silver.—Prepare a mixture of 3 grs. of ammonia, 60 grs. nitrate of silver, 90 minims of spirits of wine, 90 minims of water; when the nitrate of silver is dissolved, filter the liquid, and add a small quantity of sugar,) 15 grs.), dissolved in 1½ oz. of water and 1½ oz. spirits of wine. Put the glass into this mixture, having one side covered with varnish, gum, or some substance to prevent the silver being attached to it. Let it remain for a few days, and you have a most elegant looking-glass; yet it is far more costly than the quicksilver.

Another Method.—A sheet of tin-foil corresponding to the size of the plate of glass is evenly spread on a perfectly smooth and solid marble table, and every wrinkle on its surface is carefully rubbed down with a brush: a portion of mercury is then poured on, and rubbed over the foil with a clean piece of soft woollen stuff, after which, two rules are applied to the edges, and mercury poured on to the depth of a crown piece; when any oxide on the surface is carefully removed, and the sheet of glass, perfectly clean and dry, is slid along over the surface of the liquid metal, so that no air, dirt, or oxide can possibly either remain or get between them. When the glass has arrived at its proper position, gentle pressure is applied, and the table sloped a little to carry off the waste mercury; after which it is covered with flannel, and loaded with heavy weights; in twenty-four hours it is removed to another table, and further slanted, and this position is progressively increased during a month, till it becomes perpendicular.

Porcelain Colors.—The following are some of the colors used in the celebrated porcelain manufactory of Sevres, and the proportions in which they are compounded. Though intended for porcelain painting, nearly all are applicable to painting on glass. Flux No. 1 minium or red lead, 3 parts; white sand, washed, 1 part. This mixture is melted, by which it is converted into a greenish-coloured glass. Flux No. 2. *Gray flux.*—Of No. 1, 8 parts; fused borax in powder, 1 part. This mixture is melted. Flux No. 3. *For carmines and greens.*—Melt together fused borax, 5 parts; calcined flint, 3 parts; pure minium, 1 part. No. 1. *Indigo blue.*—Oxide of cobalt. 1 part; flux No. 3, 2 parts. *Deep azure blue.*—Oxide of cobalt, 1 part; oxide of zinc, 2 parts; flux No. 3, 5 parts. No. 2. *Emerald Green.*—Oxide of copper, 1 part; antimonic acid, 10 parts; flux No. 1, 30 parts. Pulverize together, and melt. No. 3. *Grass green.*—Green oxide of chromium, 1 part; flux No. 3, 3 parts. Triturate and melt. No. 4. *Yellow.*—Antimonic acid, 1 part; subsulphate of the peroxide of iron, 8 parts; oxide of zinc, 4 parts; flux No. 1, 36 parts. Rub up together and melt. If this color is too deep the salt of iron is diminished No. 5. *Fixed yellow for touches.*—No. 4, 1 part; white enamel of commerce, 2 parts. Melt and pour out; if not sufficiently fixed, a little sand may be added, No. 6 *Deep Nankin yellow.*—Subsulphate of iron, 1 part; oxide of zinc, 2 parts; flux No. 2, 8 parts. Triturate without melting No. 7. *Deep red.*—Subsulphate of iron, calcined in a muffle until it becomes of a beautiful capucine red, 1 part; flux No. 2, 3 parts. Mix without melting. No. 8. *Liver brown.*—Oxide of iron made of a red brown, and mixed with three times its weight of flux No. 2. A tenth of sienna earth is added to it, if it is not deep enough. No. 9. *White.*—The white enamel of commerce, in cakes. No. 10. *Deep black.*—Oxide of cobalt, 2 parts; copper, 2 parts; oxide of manganese, 1 part; flux No. 1, 6 parts; fused borax, ½ part. Melt, and add oxide of manganese, 1 part; oxide of copper, 2 parts. Triturate without melting. *The Application.*—Follow the general directions given in another part of this work, in relation to staining glass.

HOW TO WRITE ON GLASS IN THE SUN.—Dissolve chalk in aquafortis to the consistency of milk, and add to that a strong dissolution of silver. Keep this in a glass decanter well stopped. Then cut out from a paper the letters you would have appear, and paste the paper on the decanter or jar, which you are to place in the sun in such a manner that its rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor. The part of the glass through which the rays pass will turn black, whilst that under the paper will remain white. Do not shake the bottle during the operation. Used for lettering jars.

TO TRANSFER PRINTS, ETC., TO GLASS OR WOOD.—Take of gum sandarach, 4 oz.; mastic, 1 oz.; Venice turpentine, 1 oz.; alcohol, 15 oz. Digest in a bottle, frequently shaking, and it is ready for use. Directions; use, if possible, good plate glass of the size of the picture to be transferred, go over it with the above varnish, beginning at one side, press down the picture firmly and evenly as you proceed, so that no air can possibly lodge between; put aside, and let dry perfectly, then moisten the paper cautiously with water, and remove it piecemeal by rubbing carefully with the fingers; if managed nicely, a complete transfer of the picture to the glass will be effected.

BOTTLE GLASS.—No. 1. *Dark Green.*—Fused glauber-salts, 11 lbs.; soaper salts, 12 lbs.; waste soap-ashes, ½ bush.; silicious sand, ½ cwt.; glass-skimmings, 22 lbs. broken green glass, 1 cwt. to 1¼ cwt.; basalt, 25 lbs. to ¼ cwt. No. 2. *Pale Green.*—Pale sand, 100 lbs.; kelp, 35 lbs.; lixiviated wood ashes, 1½ cwt.; fresh do., 40 lbs.; pipe-clay, ¾ cwt.; cullet, or broken glass, 1 cwt. No. 3. Yellow or white sand, 120 parts; wood-ashes, 80 parts; pearl-ashes, 20 parts; common salt, 15 parts; white arsenic, 1 part; very pale.

CRYSTAL GLASS.—No. 1. Refined potashes, 60 lbs.; sand, 120 lbs.; chalk, 24 lbs.; nitre and white arsenic, of each 2 lbs.; oxide of manganese, 1 to 2 oz. No. 2. Pure white sand, 120 parts; refined ashes, 70 parts; saltpetre, 10 parts; white arsenic, ½ part; oxide of manganese, ½ part. No. 3. Sand, 120 parts; red-lead, 50 parts; purified pearlash, 40 parts; nitre, 20 parts; manganese, ½ part.

FLASK GLASS (*of St. Etienne*).—Pure silicious sand, 61 parts; potash, 3½ parts; lime, 21 parts; heavy spar, 2 parts; oxide of manganese, *q. s.*

BEST GERMAN CRYSTAL GLASS.—Take 120 lbs. of calcined flints or white sand; best pearlash, 70 lbs.; saltpetre, 10 lbs.; arsenic,

.; and 5 oz. magnesia. No. 2. (*Cheaper.*) Sand or flint, 120
; pearlash, 46 lbs.; nitre, 7 lbs.; arsenic, 6 lbs.; magnesia, 5
This will require a long continuance in the furnace, as do all
ers when much of the arsenic is used.

'LATE GLASS.—No. 1. Pure sand, 40 parts; dry carbonate of
a, 26½ parts; lime, 4 parts; nitre, 1½ parts; broken plate glass,
parts. No. 2. *Ure's.*—Quartz-sand, 100 parts; calcined sul-
te of soda, 24 parts; lime, 20 parts; cullet of soda-glass, 12
ts. No. 3. *Vienna.*—Sand, 100 parts; calcined sulphate of soda,
parts; lime, 20 parts; charcoal, 2½ parts. No. 4. *French.*—
ite quartz sand and cullet, of each 300 parts; dry carbonate of
a, 100 parts; slacked lime, 43 parts.

'ROWN GLASS.—No. 1. Sand, 300 lbs.; soda-ash, 200 lbs.; lime,
to 35 lbs.; 200 to 300 lbs. of broken glass. No. 2. (*Bohemian.*)
'ure silicious sand, 63 parts; potash, 22 parts; lime, 12 parts;
le of manganese, 1 part. No. 3. (*Prof. Schweigger.*) Pure sand,
lbs.; dry sulphate of soda, 50 parts; dry quicklime in powder,
to 20 parts; charcoal, 4 parts. *Product*, white and good.

EST WINDOW-GLASS.—No. 1. Take of white sand, 60 lbs.; puri-
. pearlashes, 30 lbs.; of saltpetre, 15 lbs.; of borax, 1 lb.; of
enic, ½ lb. This will be very clear and colorless if the ingre-
nts be good, and will not be very dear. No. 2. (*Cheaper.*)
ite sand, 60 lbs.; unpurified pearl-ashes, 25 lbs.; of common
t, 10 lbs.; nitre, 5 lbs.; arsenic, 2 lbs.; magnesia, 1½ oz. No. 3.
nmon green window-glass.—White sand, 60 lbs.; unpurified
rlashes, 30 lbs.; common salt, 10 lbs.; arsenic, 2 lbs.; mag-
ia, 2 oz.

OOKING-GLASS PLATE.—No. 1. Cleansed white sand, 60 lbs.;
rlashes, purified, 25 lbs.; saltpetre, 15 lbs.; borax, 7 lbs. This
nposition should be continued long in the fire, which should be
netimes strong and afterwards more moderate, that the glass
y be entirely free from bubbles before it be worked. No. 2.
ite sand, 60 lbs.; pearlashes, 20 lbs.; common salt, 10 lbs.;
re, 7 lbs.; borax, 1 lb. This glass will run with as little heat as
former; but it will be more brittle, and refract the rays of light
a greater degree. No. 3. Washed white sand, 60 lbs.; purified
rlashes, 25 lbs.; nitre, 15 lbs.; borax, 7 lbs. If properly man-
ed, this glass will be colorless.

WINDOW GLASS.—No. 1. Dried sulphate of soda, 11 lbs.; soaper
ts, 10 lbs.; lixiviated soap waste, ½ bush.; sand, 50 to 60 lbs.;
ss-pot skimmings, 22 lbs.; broken *pale* green glass, 1 cwt. No.
(*Paler*). White sand, 60 lbs.; pearl-ashes, 30 lbs.; common salt,
lbs.; arsenic, 10 lbs.; oxide of manganese, 2 to 4 oz. No. 3. (*Very
le.*) White sand, 60 lbs.; good pot ashes, 25 lbs.; common salt,
lbs.; nitre, 5 lbs.; arsenic, 2 lbs.; magnanese, 2 to 4 oz. as re-
ired; broken *pale* window glass, 14 lbs.

COLORED GLASS.—*Fine Blue.* To 10 lbs. of flint glass, previously
elted and cast into water, add zaffer, 6 drs., ½ oz. of calcined cop-
r, prepared by putting sheet copper into a crucible, and expos-
g it to the action of a fire not strong enough to melt the copper,
d you will have the copper in scales, which you pound. Bright
urple.—Use 10 lbs. flint glass as before; zaffer, 5 drs., precipitate
calcium, 1 dr. Gold Yellow. Twenty-eight pounds flint glass,

and a quarter pound of the tartar which is found in urine; purify by putting it in a crucible in the fire till it smoke no more; add 2 ozs. of manganese.

PAPER FOR PHOTOGRAPHING.—Wash the paper with a solution of nitrate of silver, 6 grains; distilled water, ½ oz.; dry the paper, and wash it with iodide of potassium, 5 grains; distilled water, ½ oz.; dry with gentle heat; repeat the wash with the silver solution; and when dry, the paper is ready for use. The sensitive surface is an iodide for silver, and is easily affected by light.

COLORED POTTERS' GLAZINGS.—*White:* prepare an intimate mixture of 4 parts of massicot, 2 of tin ashes, 3 fragments of crystal glass, and ½ part of sea salt. The mixture is suffered to melt in earthenware vessels, when the liquid flux may be used *Yellow;* take equal parts of massicot, red lead and sulphuret of antimony, calcine the mixture, and reduce it again to powder, add then 2 parts of pure sand, and 1½ parts of salt; melt the whole. *Green;* 2 parts of sand, 3 parts massicot, 1 part of salt and copper scales, according to the shade to be produced: melt and use. *Violet;* 1 part massicot, 3 parts sand, 1 of smalt, ⅛ part of black oxide of manganese; melt. *Blue;* white sand and massicot, equal parts; blue smalt, [illegible] part: melt. *Black;* black oxide of manganese, 2 parts; smalt, [illegible] part; burned quartz, 1 part; massicot, 1½ parts; melt. *Brown;* green bottle glass, 1 part; manganese, 1 part; lead, 2 parts; melt.

TO PRINT A PICTURE FROM THE PRINT ITSELF.—The page or picture is soaked in a solution, first of potassa, and then of tartaric acid. This produces a perfect diffusion of crystals of bitartarate of potassa through the texture of the unprinted part of the paper. As this salt resists oil, the ink roller may now be passed over the surface, without transferring any part of its contents except to the printed part.

TO CLEAN OLD OIL-PAINTINGS.—Dissolve a small quantity of salt in stale urine; dip a woollen cloth in the mixture, and rub the paintings over with it till they are clean; then wash them with a sponge and clean water; dry them gradually, and rub them over with a clean cloth. Should the dirt not be easily removed by the above preparation, add a small quantity of soft soap. Be very careful not to rub the paintings too hard.

TO RENEW OLD OIL-PAINTINGS.—The blackened lights of old pictures may be instantly restored to their original hue by touching them with deutoxide of hydrogen diluted with six or eight times its weight of water. The part must be afterwards washed with a clean sponge and water.

CAST ENGRAVINGS.—Take the engraved plate you wish to copy, and arrange a support of suitable materials round it: then pour on it the following alloy in a state of perfect fusion; tin, 1 part; lead, 64 parts; antimony, 12 parts. These "cast plates" may be worked off on a common printing press, and offer a ready mode of procuring cheap copies of the works of our celebrated artists.

MAGIC PAPER.—Take lard oil, or sweet oil, mixed to the consistence of cream, with either of the following paints, the color of which is desired: Prussian blue, lampblack, Venetian red, or chrome green, either of which should be rubbed with a knife on a plate or stone until smooth. Use rather thin but firm paper; put on with a sponge, and wipe off as dry as convenient; then lay them between uncolored paper, or between newspapers, and press by laying books or some other flat substance upon them until the surplus oil is absorbed, when it is ready for use.

To Make Grindstones from Common Sand.—River sand, 50 lbs; shellac, 10 parts; powdered glass, 2 parts; melt in an iron pot, and cast into moulds.

To Cast Figures in imitation of Ivory.—Make isinglass and brandy into a paste. with powdered egg-shells very finely ground You may give it what color you choose; but cast it warm into your mould which you previously oil over; leave the figure in the mould till dry, and you will find on taking it out that it bears a very strong resemblance to ivory.

To take a Plaster of Paris Cast from a Person's Face.—The person must lie on his back, and his hair be tied behind; into each nostril put a conical piece of paper, open at each end, to allow of breathing. The face is to be lightly oiled over, and the plaster, being properly prepared, is to be poured over the face, taking particular care that the eyes are shut, till it is a quarter of an inch thick. In a few minutes the plaster may be removed In this a mould is to be formed, from which a second cast is to be taken, that will furnish casts exactly like the original.

To attach Glass or Metal Letters to Plate Glass.—Copal varnish, 15 parts; drying oil, 5 parts; turpentine, 3 parts; oil of turpentine, 2 parts; liquified glue, 5 parts. Melt in a water bath, and add 10 parts of slacked lime.

Turner's Cement.—Bees' wax. 1 oz.; resin, ½ oz.; pitch, ½ oz.; melt, and stir in fine brick dust.

Bank Note Glue,—Dissolve 1 lb. of fine glue or gelatine in water; evaporate it till most of the water is expelled; add ½ lb. of brown sugar, and pour it into moulds.

Cement for Electrical Machines and Galvanic Troughs.—Melt together 5 lbs of resin and 1 lb. of bee's-wax, and stir in 1 lb of red ochre (highly dried. and still warm) and 4 oz. of plaster of Paris, continuing the heat a little above 212°, and stirring constantly till all frothing ceases, or (for troughs) rosin, 6 lbs.; dried red ochre, 1 lb., calcined plaster of Paris, ½ lb., linseed oil, ¼ lb.

Hydraulic Cement.—Powdered clay, 3 lbs.; oxide of iron, 1 lb.; and boiled oil to form a stiff paste.

Engineers' Cement.—Equal parts of red and white lead, with drying oil, spread on tow or canvas. An admirable composition for uniting large stones in cisterns.

Stone Cement.—River sand, 20 parts; litharge, 2 parts; quicklime, 1 part; mix with linseed oil.

Best Cement for Aquaria.—It is the same as that used in constructing the tanks of the Zoological Gardens, London. One part, by measure, say a gill of litharge; 1 gill of plaster of Paris; 1 gill of dry, white sand; ⅓ a gill of finely powdered resin. Sift, and keep corked tight until required for use, when it is to be made into a putty by mixing in boiled oil (linseed) with a little patent drier added Never use it after it has been mixed (that is, with the oil) over fifteen hours. This cement can be used for marine as well as fresh water aquaria as it resists the action of salt water. The tank can be used immediately, but it is best to give it three or four hours to dry.

COMMON PASTE.—To a tablespoonful of flour add gradually ½ pt. of cold water, and mix till quite smooth; add a pinch of powdered alum, some add a small pinch of powdered rosin, and boil for a few minutes, stirring constantly. The addition of a little brown sugar and a few grains of corrosive sublimate, will preserve it for years.

FOR LUTE, or cement for closing joints of apparatus, mix Paris plaster with water to a soft paste, and apply it immediately. It bears nearly a red heat. To render it impervious, rub it over with wax and oil.

ROMAN CEMENT.—Slacked lime, 1 bush., green copperas, 3½ lbs., fine gravel sand, ½ bush. Dissolve the copperas in hot water, and mix all together to the proper consistency for use; use the same day it is mixed, and keep stirring it continually with a stick while in use.

VICAT'S HYDRAULIC CEMENT is prepared by stirring into water a mixture of 4 parts chalk and 1 part clay; mix with a vertical wheel in a circular trough, letting it run out in a large receiver. A deposit soon takes place which is formed into small bricks, which, after being dried in the sun, are moderately calcined. It enlarges about ⅔ when mixed with water.

GLUE.—Powdered chalk added to common glue strengthens it. A glue which will resist the action of water is made by boiling 1 lb. of glue in 2 qts. of skimmed milk.

CHEAP WATERPROOF GLUE.—Melt common glue with the smallest possible quantity of water; add, by degrees, linseed oil, rendered drying by boiling it with litharge. While the oil is being added, the ingredients must be well stirred, to incorporate them thoroughly.

FIRE AND WATERPROOF GLUE.—Mix a handful of quick-lime with 4 oz. of linseed oil; thoroughly lixiviate the mixture; boil it to a good thickness, and spread it on tin plates in the shade: it will become very hard, but can be dissolved over a fire, like common glue, and is then fit for use.

PREPARED LIQUID GLUE.—Take of best white glue, 16 oz.; white-lead, dry, 4 oz.; rain-water, 2 pts.; alcohol, 4 oz. With constant stirring, dissolve the glue and lead in the water, by means of a water-bath. Add the alcohol, and continue the heat for a few minutes. Lastly, pour into bottles, while it is still hot.

MASTIC CEMENT FOR COVERING THE FRONTS OF HOUSES.—Fifty parts, by measure, of clean dry sand, 50 of limestone (not burned) reduced to grains like sand, or marble dust, and 10 parts of red lead, mixed with as much boiled linseed oil as will make it slightly moist. The bricks, to receive it, should be covered with three coats of boiled oil, laid on with a brush, and suffered to dry before the mastic is put on. It is laid on with a trowel like plaster, but it is not so moist. It becomes hard as stone in a few months. Care must be exercised not to use too much oil.

CEMENT FOR TILE-ROOFS.—Equal parts of whiting and dry sand, and 25 per cent. of litharge, made into the consistency of putty with linseed oil. It is not liable to crack when cold, nor melt, like coal-tar and asphalt, with the heat of the sun.

Cement for Outside of Brick Walls.—Cement for the outside of brick walls, to imitate stone, is made of clean sand, 90 parts; litharge, 5 parts; plaster of Paris, 5 parts; moistened with boiled linseed oil. The bricks should receive two or three coats of oil before the cement is applied.

Excellent Cheap Roofing.—Shingles Superseded.—Have your roof stiff, rafters made of stuff 1½ by 8 inches, well supported and 6 feet apart, with ribs 1 inch by 2 inches, set edgeways, well nailed to the rafters, about 18 inches apart. The boards may be thin, but must be well seasoned, and nailed close together; this done, lay down and cover the roof with thin, soft, spongy straw paper used in making paper-boxes, which comes in rolls, and comes very low. Lay in courses up and down the roof, and lap over, nailing down with common No. 6 tacks, with leather under the heads like carpet-tacks. Then spread on several coatings of the following composition, previously boiled, stirred, and mixed together: good clean tar, 8 gals.; Roman cement, 2 gals. (or in its place very fine, clean sand may be used); resin, 5 lbs.; tallow, 3 lbs.; apply hot; and let a hand follow, and sift on sharp grit sand, pressing it into the tar composition. If wished fire-proof, go over the above with the following preparation: slake stone lime under cover with hot water till it falls into a fine powder, sift and mix 6 qts. of this with 1 qt. salt, add 2 gals. water, boil and skim. To 5 gals. of this add 1 lb. of alum, and 1½ lb. of copperas, slowly, while boiling, 1½ lbs. potash, and 4 qts. of clean, sharp sand, and any coloring desired. Apply a thick coat with a brush, and you have a roof which no fire can injure from the outside.

Water Lime at fifty Cents per Barrel.—Fine, clean sand, 100 lbs.; quick-lime in powder, 28 lbs.; bone ashes, 14 lbs.; for use, beat up with water, and use as quick as possible.

Cement for Seams in Roofs.—Take equal quantities of white lead and white sand, and as much oil as will make it into the consistence of putty. It will in a few weeks become as hard as stone.

To make Door Plates.—Cut your glass the right size, and make it perfectly clean with alcohol or soap; then cut a strip of tin-foil sufficiently long and wide for the name, and with a piece of ivory or other burnisher rub it lengthwise to make it smooth; now wet the glass with the tongue (as saliva is the best sticking substance), or if the glass is very large, use a weak solution of gum arabic, or the white of an egg in half a pint of water, and lay on the foil, rubbing it down to the glass with a bit of cloth, then also with the burnisher; the more it is burnished the better will it look; now mark the width on the foil which is to be the height of the letter, and put on a straight edge, and hold it firmly to the foil, and with a sharp knife cut the foil, and take off the superfluous edges; then either lay out the letters on the back of the foil (so they shall read correctly on the front) by your own judgment, or by means of pattern letters, which can be purchased for that purpose; cut with the knife, carefully holding down the pattern or straight edge, whichever you use; then rub down the edge of all the letters with the back of the knife, or edge of the burnisher, which prevents the black paint or japan, which you next put over the back of the plate, from getting under the foil; having put a line above and one below the name, or a border around the whole plate or not, as you bargain for the job. The japan is made by dissolving asphaltum in just enough turpentine to cut it; apply with a brush, as other paint, over the back of the letters, and over the glass forming a background. This is used on the iron plate of the frame also, putting it on when the plate is a little hot, and as soon as it cools, it is dry. A little lampblack may be rubbed into it if you desire it any blacker than it is without it.

SOLUBLE GLASS.—Powdered quartz, 15 parts; potash, 10 parts; charcoal, 1 part; these are melted together, worked in cold water, and then boiled with 5 parts water, in which they entirely dissolve. It is then applied to wood-work, or any other required substances.

TO RENDER WOOD INDESTRUCTIBLE.—*Robbins's Process.* This seems to be a process of inestimable value, and destined to produce very important results. The apparatus used consists of a retort or still, which can be made of any size or form, in which resin, coal tar, or other oleaginous substances, together with water, are placed in order to subject them to the action of the heat. Fire being applied beneath the retort containing the coal tar, &c., oleaginous vapor commences to rise, and pass out through a connecting pipe into a large iron tank or chamber (which can also be built of any size), containing the timber, &c., to be operated upon. The heat acts at once on the wood, causing the sap to flow from every pore, which, rising in the form of steam, condenses on the body of the chamber, and discharges through an escape pipe in the lower part. In this process a temperature of 212° to 250° Fahr is sufficient to remove the surface moisture from the wood; but after this the temperature should be raised to 300° or more, in order to completely saturate and permeate the body of the wood with the antiseptic vapors and heavier products of the distillation. The hot vapor coagulates the albumen of the wood, and opens the pores, so that a large portion of the oily product or creosote is admitted; the contraction resulting from the cooling process hermetically seals them, and decay seems to be almost impossible. There is a man-hole in the retort, used to change or clean out the contents; and the wood chamber is furnished with doors made perfectly tight. The whole operation is completed in less than one hour, rendering the wood proof against rot, parasites, and the attacks of the *Teredo navilis* or naval worm.

GERMAN STONE COATING FOR WOOD.—Chalk, 40 parts; rosin, 50 parts; linseed oil, 4 parts; melt together. To this add 1 part of oxide of copper, afterwards 1 part of sulphuric acid; add this last carefully; apply with a brush

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WATCHMAKERS, JEWELLERS, GILDERS, &c., RECEIPTS.

ON WATCH CLEANING.—It is hardly necessary to say that great caution must be observed in taking the watch down; that is, in *separating* its parts. If you are new at the business think before you act, and then act slowly. Take off the hands carefully, so as not to bend the slender pivots upon which they work; this will be the first step. Second, loosen and lift the movement from the case. Third, remove the dial and dial wheels. Fourth, let down the mainspring by placing your bench key upon the arbor, or "winding post," and turning as though you were going to wind the watch until the click rests lightly upon the ratchet; then with your screw-driver press the point of the click away from the teeth, and ease down the springs. Fifth, draw the screws (or pins) and remove the bridges of the train, or the upper plate, as the case may be. Sixth, take out the balance. Great care must be observed in this, or you will injure the hair-spring. The stud or little square post into which the hair-spring is fastened may be removed from the bridge or plate of most modern watches, without unkeying the spring, by slipping a thin instrument, as the edge of a knife blade, under the corner of it and prying upward. This will save you a considerable amount of trouble, as you will not have the hair-spring to adjust when you reset the balance.

If the watch upon which you propose to work has an upper plate, as an American or an English lever for instance, loosen the lever before you have entirely separated the plates, otherwise it will hang and most likely be broken.

Having the machine now down, brush the dust away from its different parts, and subject them to a careful examination with your eye-glass. Assure yourself that the teeth of the wheels and leaves of the pinions are all perfect and smooth; that the pivots are all straight, round, and highly polished; that the holes through which they are to work are not too large, and have not become oval in shape; that every jewel is smooth and perfectly sound; and that none of them are loose in their settings. See also that the escapement is not too deep or too shallow; that the lever or cylinder is perfect; that all the wheels have sufficient play to avoid friction, but not enough to derange their coming together properly; that none of them work against the pillar-plate; that the balance turns horizontally and does not rub; that the hair-spring is not bent or wrongly set so that the coils rub on each other, on the plate, or on the balance; in short, that everything about the whole movement is just as reason would teach you it should be. If you find it otherwise, proceed to repair in accordance with a carefully weighed judgment and the processes given in this chapter, after which, clean; if not, the watch only needs to be cleaned, and, therefore, you may go ahead with your work at once.

To Clean.—Many watchmakers wet the pillar plates and bridges with saliva, and then, dipping the brush into pulverized chalk or Spanish whiting, rub vigorously until they appear bright. This is not a good plan, as it tends to remove the plating and roughen the parts, and the chalk gets into the holes and damages them, or sticks around the edges of the wheel-beds. The best process is to simply blow your breath upon the plate or bridge to be cleaned, *and then to use your brush* with a little prepared chalk. (See *recipe for preparing it.)* The wheels and bridges should be held *between the thumb and finger* in a piece of soft paper while undergoing the process; otherwise the oil from the skin will prevent their becoming clean. The pinions may be cleaned by sinking them several times into a piece of pith, and the holes by turning a nicely shaped piece of pivot wood into them, first dry, and afterwards oiled a very little with watch oil. When the holes pass through jewels, you must work gently to avoid breaking them.

The oiling above named is all the watch will need. A great fault with many watchmakers lies in their use of too much oil.

THE "CHEMICAL PROCESS."—Some watchmakers employ what they call the "Chemical Process" to clean and remove discoloration from watch movements. It is as follows:—

Remove the screws and other steel parts; then dampen with a solution of oxalic acid and water. Let it remain a few moments, after which immerse in a solution made of one-fourth pound cyanuret potassa to one gallon rain water. Let remain about five minutes, and then rinse well with clean water, after which you may dry in sawdust, or with a brush and prepared chalk, as suits your convenience. This gives the work an excellent appearance.

TO PREPARE CHALK FOR CLEANING.—Pulverize your chalk thoroughly, and then mix it with clear rain water in the proportion of two pounds to the gallon. Stir well, and then let stand about two minutes. In this time the gritty matter will have settled to the bottom. Pour the water into another vessel, slowly so as not to stir up the settlings. Let stand until entirely settled, and then pour off as before. The settlings in the second vessel will be your prepared chalk, ready for use as soon as dried.

Spanish whiting, treated in the same way, makes a very good cleaning or polishing powder. Some operatives add a little jeweller's rouge, and we think it an improvement; it gives the powder a nice color at least, and therefore adds to its importance in the eyes of the uninitiated. In cases where a sharper polishing powder is required, it may be prepared in the same way from rotten stone.

PIVOT WOOD.—Watchmakers usually buy this article of watch-material dealers. A small shrub known as Indian arrow-wood, to be met with in the northern and western states, makes an excellent pivot wood. It must be cut when the sap is down, and split into quarters so as to throw the pith outside of the rod.

PITH FOR CLEANING.—The stalk of the common mullen affords the best pith for cleaning pinions. Winter, when the stalk is dry, is the time to gather it. Some use cork instead of pith, but it is inferior.

TO PIVOT.—When you find a pivot broken, you will hardly be at a loss to understand that the easiest mode of repairing the damage is to drill into the end of the pinion or staff, as the case may be, and having inserted a new pivot, turn it down to the proper proportions. This is by no means a difficult thing when the piece to be drilled is not too hard, or when the temper may be slightly drawn without injury to the other parts of the article.

TO TELL WHEN THE LEVER IS OF PROPER LENGTH. — You may readily learn whether or not a lever is of proper length, by measuring from the guard point to the pallet staff, and then comparing with the roller or ruby-pin table; the diameter of the table should always be just half the length measured on the lever. The rule will work both ways, and may be useful in cases where a new ruby-pin table has to be supplied.

To change Depth of Lever Escapement.—If you are operating on a fine watch, the best plan is to put a new staff into the lever, cutting its pivots a little to one side, just as far as you desire to change the escapement. Common watches will not, of course, justify so much trouble. The usual process in their case is to knock out the staff, and with a small file cut the hole oblong in a direction opposite to that in which you desire to move your pallets; then replace the staff, wedge it to the required position, and secure by soft soldering.

In instances where the staff is put in with a screw, you will have to proceed differently. Take out the staff, prize the pallets from the lever, file the pin holes to slant in the direction you would move the pallets, without changing their size on the other side of the lever. Connect the pieces as they were before, and, with the lever resting on some solid substance, you may strike lightly with your hammer until the bending of the pins will allow the pallets to pass into position.

To tell when the Lever Pallets are of proper Size.—The clear space between the pallets should correspond with the outside measure, on the points of three teeth of the scape wheel. The usual mode of measuring for new pallets is to set the wheel as close as possible to free itself when in motion. You can arrange it in your depthing tool, after which a measurement between the pivot holes of the two pieces, on the pillar plate, will show you exactly what is required.

To lengthen Levers of Anchor-escapement Watches without Hammering or Soldering.—Cut square across with a screw-head file, a little back from the point above the fork, and, when you have thus cut into it to a sufficient depth, bend forward the desired distance the piece thus partially detached. In the event of the piece snapping off while bending—which, however, rarely happens—file down the point level with the fork, and insert a pin, English lever style.

To temper Case and other Springs of Watches.—Draw the temper from the spring, and fit it properly in its place in the watch; then take it out and temper it hard in rain-water (the addition of a little table-salt to the water will be an improvement); after which place it in a small sheet-iron ladle or cup, and barely cover it with linseed-oil; then hold the ladle over a lighted lamp until the oil ignites; let it burn until the oil is nearly, not quite consumed; then re-cover with oil and burn down as before; and so a third time; at the end of which, plunge it again into water. Main and hair-springs may, in like manner, be tempered by the same process; first draw the temper, and properly coil and clamp to keep in position, and then proceed the same as with case-springs.

To make Red Watch Hands.—1 oz. carmine, 1 oz. muriate of silver, ¼ oz. tinner's japan; mix together in an earthen vessel, *and hold over a spirit-lamp* until formed into a paste. Apply *this to the watch* hand, and then lay it on a copper plate, face side up, and heat the plate sufficiently to produce the color desired.

To Drill into Hard Steel.—Make your drill oval in form, instead of the usual pointed shape, and temper as hard as it will bear without breaking; then roughen the surface where you desire to drill with a little diluted muriatic acid, and, instead of oil, use turpentine or kerosene, in which a little gum camphor has been dissolved, with your drill. In operating, keep the pressure on your drill firm and steady; and if the bottom of the hole should chance to become burnished, so that the drill will not act, as sometimes happens, again roughen with diluted acid as before; then clean out the hole carefully, and proceed again.

To Case-harden Iron.—If you desire to harden to any considerable depth, put the article into a crucible with cyanide of potash, cover over and heat altogether, then plunge into water. This process will harden perfectly to the depth of one or two inches.

To Put Teeth in Watch or Clock Wheels without Dovetailing or Soldering.—Drill a hole somewhat wider than the tooth, square through the plate, a little below the base of the tooth; cut from the edge of the wheel square down to the hole already drilled; then flatten a piece of wire so as to fit snugly into the cut of the saw, and with a light hammer form a head on it like the head of a pin. When thus prepared, press the wire or pin into position in the wheel, the head filling the hole drilled through the plate, and the end projecting out so as to form the tooth; then with a sharp pointed graver cut a small groove each side of the pin from the edge of the wheel down to the hole, and with a blow of your hammer spread the face of the pin so as to fill the grooves just cut. Repeat the same operation on the other side of the wheel, and finish off in the usual way. The tooth will be found perfectly riveted in on every side, and as strong as the original one, while in appearance it will be equal to the best dovetailing.

To tighten a Cannon Pinion on the Centre Arbor when too loose.—Grasp the arbor lightly with a pair of cutting nippers, and, by a single turn of the nippers around the arbor, cut or raise a small thread thereon.

To Frost Watch Movements.—Sink that part of the article to be frosted for a short time in a compound of nitric acid, muriatic acid and table salt, one ounce of each. On removing from the acid, place it in a shallow vessel containing enough sour beer to merely cover it, then with a fine scratch brush scour thoroughly, letting it remain under the beer during the operation. Next wash off, first in pure water and then in alcohol. Gild or silver in accordance with any recipe in the plating department.

Rule for determining the correct Diameter of a Pinion by measuring Teeth of the Wheel that matches into it.—The term full, as used below, indicates full measure from outside to outside of the teeth named, and the term centre, the measure from centre of one tooth to centre of the other tooth named, inclusive.

For diameter of a pinion of 15 leaves measure, with calipers, a shade less than 6 teeth of the wheel, *full*

For diameter of a pinion of 14 leaves measure, with calipers, a shade less than 6 teeth of the wheel, *centre.*

For diameter of a pinion of 12 leaves measure, with calipers, 5 teeth of the wheel, *centre.*

For diameter of a pinion of 10 leaves measure, with calipers, 4 teeth of the wheel, *full.*

For diameter of a pinion of 9 leaves measure, with calipers, a little less than 4 teeth of the wheel, *full.*

For diameter of a pinion of 8 leaves measure, with calipers, a little less than 4 teeth of the wheel, *centre.*

For diameter of a pinion of 7 leaves measure, with calipers, a little less than 3 teeth of the wheel, *full.*

For diameter of a pinion of 6 leaves measure, with calipers, 3 teeth of the wheel, *centre.*

For diameter of a pinion of 5 leaves measure, with calipers, 3 teeth of the wheel, *centre.*

For diameter of a pinion of 4 leaves measure, with calipers, one half of one space over 2 teeth of the wheel, *full.*

As a general rule, pinions that lead, as in the hour wheel, should be somewhat larger than those that drive, and pinions of clocks should generally be somewhat larger proportionally than those of watches.

To Polish Wheels perfectly without injury.—Take a flat burnishing file, warm it over a spirit lamp, and coat it lightly with bees'-wax. When cold, wipe off as much of the wax as can be readily removed, and with your file thus prepared, polish the wheel, resting the wheel while polishing on a piece of cork. The finish produced will be quite equal to the finest buff polish, while there will be no clogging, and the edges of the arms and teeth will remain perfectly square.

Rules for determining the correct Length of the Lever, size of Ruby-Pin Table, size of the Pallets, and depth of Escapement of Lever Watches.—A lever, from the guard point to the pallet staff, should correspond in length with twice the diameter of the ruby-pin table, and when a table is accidentally lost, the correct size thereof may be known by measuring half the length of the lever between the points above named. For correct size of pallet, the clear space between the pallets should correspond with the outside measure on the points of three teeth of the escapement wheel. The only rule that can be given, without the use of diagrams, for correct depth of the escapements, is to set it close as it will bear, and still free itself perfectly when in motion. This may be done by first placing the escapement in your depthing tool, and then setting it to the correct depth. Then by measuring the distance between the pivots of the lever staff and escapement wheel, as now set, and the corresponding pivot holes in the watch, you determine correctly how much the depth of the escapement requires to be altered.

To remove rust from Iron or Steel, &c.—For cleaning purposes, &c., kerosene oil or benzine are probably the best things known. When articles have become pitted by rust, however, these can of course, only be removed by mechanical means, such as scouring with fine powder, or flour of emery and oil, or with very fine emery paper. To prevent steel from rusting, rub it with a mixture of lime and oil, or with mercurial ointment, either of which will be found valuable.

To Put Watches in Beat.—If a cylinder escapement, or a detached lever, put the balance into a position, then turn the regulator so that it will point directly to the pivot-hole of the pallet staff, if a lever, or of the scape-wheel, if a cylinder. Then lift out the balance with its bridge or clock, turn it over and set the ruby-pin directly in line with the regulator, or the square cut of the cylinder at right angles with it. Your watch will then be in perfect beat.

In case of an American or an English lever, when the regulator is placed upon the plate, you will have to proceed differently. Fix the balance into its place, cut off the connection of the train, if the mainspring is not entirely down, by slipping a fine broach into one of the wheels, look between the plates and ascertain how the lever stands. If the end farthest from the balance is equidistant between the two brass pins, it is all right; if not, change the hair-spring till it becomes so.

If dealing with a duplex watch, you must see that the roller notch, when the balance is at rest, is exactly between the locking tooth and the line of centre; that is, a line drawn from the centre of the roller to the centre of the scape-wheel. The balance must start from its rest and move through an arc of about ten degrees before bringing the locking tooth into action.

To Prevent a Chain Running off the Fusee.—In the first place, you must look and ascertain the cause of the difficulty. If it results from the chain being too large, the only remedy is a new chain. If it is not too large, and yet runs off without any apparent cause, change it end for end—that will generally make it go all right. In cases where the channel in the fusee has been damaged and is rough, you will be under the necessity of dressing it over with a file the proper size and shape. Sometimes you find the chain naturally inclined to work away from the body of the fusee. The best way to remedy a difficulty of this kind is to file off a very little from the outer lower edge of the chain the entire length; this, as you can see, will incline it to work on instead of off. Some workmen, when they have a bad case and a common watch, change the standing of the fusee so as to cause the winding end of its arbor to incline a little from the barrel. This, of course, cannot do otherwise than make the chain run to its place.

To Weaken the Hair-Spring.—This is often effected by grinding the spring down. You remove the spring from the collet, and place it upon a piece of pivot wood cut to fit the centre coil. A piece of soft steel wire, flattened so as to pass freely between the coils, and armed with a little pulverized oil-stone and oil, will serve as your grinder, and with it you may soon reduce the strength of the spring. Your operations will, of course, be confined to the centre coil, for no other part of the spring will rest sufficiently against the wood to enable you to grind it, but this will generally suffice. The effect will be more rapid than one would suppose, therefore it will stand you in hand to be careful, or you may get the spring too weak before you suspect it.

LIST OF TRAINS OF WATCHES.

SHOWING THE NUMBER OF TEETH IN THE WHEELS, LEAVES IN THE PINIONS, BEATS IN A MINUTE, AND TIME THE FOURTH WHEEL REVOLVES IN.

Trains, for Seven Teeth in the Escapement Wheel.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one minute.	No. of Seconds the 4th Wheel revolves in.
72	66	6	58	6	7	6	298—	27
66	64	6	64	6	7	6	292+	31
66	64	6	63	6	7	6	287+	31
66	63	6	63	6	7	6	283—	31
66	63	6	62	6	7	6	278+	31
66	63	6	61	6	7	6	274—	31
66	63	6	60	6	7	6	269+	31

Trains, for Nine Teeth in the Escapement Wheel.

63	60	6	57	6	9	6	299+	84
66	60	6	54	6	9	6	297	83
63	60	6	56	6	9	6	294	84
66	60	6	53	6	9	6	291+	83
63	60	6	55	6	9	6	289—	84
66	60	6	52	6	9	6	286	83
63	60	6	54	6	9	6	283+	84
66	60	6	51	6	9	6	280+	83
63	60	6	53	6	9	6	278+	84
66	60	6	50	6	9	6	275	83
63	60	6	52	6	9	6	273	84

Trains, for Eleven Teeth in the Escapement Wheel.

60	60	6	49	6	11	6	300—	36
60	54	6	54	6	11	6	297	40
60	56	6	52	6	11	6	230—	30
64	52	6	52	6	11	6	294—	30
58	56	6	53	6	11	6	292+	40
60	54	6	53	6	11	6	291+	40
62	54	6	51	6	11	6	290—	39
58	54	6	54	6	11	6	287+	41
58	55	6	53	6	11	6	287	41
59	54	6	53	6	11	6	286+	41
60	54	6	52	6	11	6	286	40
60	55	6	51	6	11	6	286—	39
61	55	6	50	6	11	6	285—	39
63	55	6	48	6	11	6	282+	38
59	54	6	52	6	11	6	281+	41
60	54	6	51	6	11	6	281+	40
61	54	6	50	6	11	6	280—	39
56	54	6	54	6	11	6	277+	43
60	60	6	48	6	11	6	293+	36
62	54	6	52	6	11	6	295+	39
63	54	6	50	6	11	6	289—	38
63	48	6	56	6	11	6	287+	43
70	*70*	7	*56*	7	11	7	293+	38
70	*70*	7	48	7	11	6	293+	38
70	*60*	7	48	6	11	6	293+	38

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves in.
60	70	6	48	7	11	6	293+	36
63	50	6	56	7	11	6	287+	40
63	63	6	50	7	11	6	289—	38
80	80	8	64	8	11	8	293+	36
80	80	8	56	8	11	7	293+	36
80	80	8	48	8	11	6	293+	36
80	70	8	56	7	11	7	293+	36
80	70	8	48	7	11	6	293+	36
80	60	8	48	6	11	6	293+	36
70	80	7	56	8	11	7	293+	36
70	80	7	48	8	11	6	293+	36
60	80	6	48	8	11	6	293+	36
84	72	8	50	8	11	6	289—	38
84	63	8	50	7	11	6	289—	38
84	54	8	50	6	11	6	289—	38
63	72	6	50	8	11	6	289—	38
63	63	6	50	7	11	6	289—	38
84	64	8	56	8	11	6	287+	40
84	56	8	56	7	11	6	287+	40
84	48	8	56	6	11	6	287+	40
63	64	6	56	8	11	6	287+	40
63	56	6	56	7	11	6	287+	40

Trains, for Thirteen Teeth in the Escapement Wheel.

54	53	6	52	6	13	6	298+	45
56	53	6	50	6	13	6	298—	44
59	51	6	49	6	13	6	296—	43
60	51	6	48	6	13	6	294+	42
54	53	6	51	6	13	6	293—	45
56	53	6	49	6	13	6	292—	44
56	54	6	48	6	13	6	291+	44
57	53	6	48	6	13	6	291—	43
54	52	6	51	6	13	6	287+	46
54	43	6	50	6	13	6	287+	45
50	51	6	50	6	13	6	286+	45
54	52	6	50	6	13	6	282—	46
56	51	6	49	6	13	6	281—	45
57	51	6	48	6	13	6	280—	44
52	52	6	51	6	13	6	277—	48
53	52	6	50	6	13	6	276+	46
52	52	6	52	6	13	6	293—	46
55	51	6	51	6	13	6	287	46
56	50	6	51	6	13	6	286+	46
56	52	6	48	6	13	6	280+	44
56	52	6	50	6	13	6	292+	44
60	48	6	48	6	13	6	277+	45
60	50	6	48	6	13	6	289—	43
60	54	6	60	8	13	6	292+	53
60	58	7	56	7	13	6	287+	51
60	60	8	54	6	13	6	300	44
62	56	7	56	7	13	6	296+	47
63	52	7	51	6	13	6	285	60
63	60	7	60	7	13	6	290	60
64	60	7	60	7	13	6	285	60
72	70	8	68	8	13	6	280	60
74	68	8	68	8	13	6	288+	60

Trains, for Fifteen Teeth in the Escapement Wheel.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Second the 4th Wheel revolves in.
54	50	6	48	6	15	6	286	48
58	48	6	46	6	15	6	290	50
48	45	6	59	6	15	6	291—	60
48	45	6	58	6	15	6	300	62
48	45	6	57	6	15	6	288	62
48	45	6	56	6	15	6	288	50
56	48	6	46	6	15	6	289—	50
63	56	7	56	7	15	7	288	50
60	56	8	58	7	15	6	288	50
62	60	8	60	8	15	6	288	50
72	64	8	50	8	15	6	288	50
72	64	8	56	8	15	7	288	50
72	64	8	64	8	15	8	288	50
52	50	6	48	6	15	6	288	50
54	48	6	48	6	15	6	288	50
72	64	8	48	8	16	6	288	50
72	80	8	64	10	15	8	288	50
72	80	8	56	10	15	7	288	50
72	80	8	48	10	15	6	288	50
63	80	7	64	10	15	8	288	50
63	80	7	56	10	15	7	288	50
63	80	7	48	10	15	6	288	50

Trains, for Seventeen Teeth in the Escapement Wheel.

64	80	8	48	10	17	6	299+	53
54	48	6	44	6	17	6	299+	50
51	48	6	45	6	17	6	295+	53
54	48	6	43	6	17	6	292+	50
48	48	6	48	6	17	6	290+	53
51	48	6	45	6	17	6	289	53
54	48	6	42	6	17	6	286—	53
48	48	6	47	6	17	6	284+	53
51	48	6	44	6	17	6	283—	53
48	48	6	46	6	17	6	278	53
48	48	6	45	6	17	6	272	53
64	64	8	64	8	17	8	290+	50
72	64	8	56	8	17	8	286—	50
64	64	8	60	8	17	8	289—	53
56	56	7	56	7	17	7	290+	53
63	56	7	49	7	17	7	286—	50
64	56	8	48	7	17	6	290+	53
80	80	10	64	10	17	8	290+	53
80	64	10	64	8	17	8	290+	53
80	64	10	56	8	17	7	290+	53
80	64	10	48	8	17	6	290+	53
80	56	10	56	7	17	7	290+	53
80	56	10	48	7	17	6	290+	53
64	80	8	64	10	17	8	290+	53
64	80	8	56	10	17	7	290+	53

To Remove Soft Solder from Gold.—Place the work in spirits of salts, or remove as much as possible with the scraper, using a gentle heat to enable you to get off the solder more easily. Very useful to be known where hard soldering is required, either in *bright or colored work.*

Trains, for Third Wheel and Patent Seconds.

No. of Teeth in the Centre Wheel	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves in.
60	72	6	60	12	..	6	300	60
60	60	6	60	10	..	6	300	60
60	48	6	60	8	..	6	300	60
48	60	6	60	8	..	6	300	60
60	72	6	54	12	..	6	270	60
60	60	6	54	10	..	6	270	60
48	60	6	54	8	..	6	270	60
60	72	6	48	12	..	6	240	60
60	60	6	48	10	..	6	240	60
48	60	6	48	8	..	6	240	60

Trains, for Fourth Wheel Seconds, with Eleven Teeth in the Escapement Wheel.

48	45	6	71	6	11	6	260+	60
48	45	6	74	6	11	6	271+	60
48	45	6	76	6	11	6	279—	60
48	45	6	78	6	11	6	286	60
60	49	7	74	7	11	6	271+	60
60	49	7	76	7	11	6	279—	60
60	49	7	78	7	11	6	286	60
45	56	6	74	7	11	6	271+	60
45	56	6	76	7	11	6	279—	60
45	56	6	78	7	11	6	286	60
64	60	8	74	8	11	6	271+	60
64	60	8	76	8	11	5	279—	60
64	60	8	78	8	11	6	286	60
60	56	8	74	7	11	6	271+	60
60	56	8	76	7	11	6	279—	60
60	56	8	78	7	11	6	286	60
60	48	8	74	6	11	6	271+	60
48	48	8	78	6	11	6	286	60
48	60	6	74	8	11	6	271+	60
48	60	6	78	8	11	6	286	60
56	60	7	74	8	11	6	271+	60

Trains, for Fourth Wheel Seconds, with Thirteen Teeth in the Escapement Wheel.

64	60	8	66	8	13	6	286	60
64	60	8	67	8	13	6	290+	60
64	60	8	68	8	13	6	295—	60
64	60	8	69	8	13	6	299	60
60	49	7	77	7	13	7	286	60
60	49	7	66	7	12	6	286	60
60	49	7	67	7	13	6	290+	60
48	45	6	66	6	13	6	286	60
48	45	6	67	6	13	6	290+	60
48	45	6	68	6	13	6	264—	60
48	45	6	69	6	13	6	299	60
60	56	8	66	7	13	6	286	60
80	60	10	66	8	13	6	286	60
64	75	8	66	10	13	6	286	60
48	60	6	66	8	13	6	286	60
48	75	6	66	10	13	6	286	60
45	56	6	66	7	13	6	286	60
56	75	7	68	10	13	6	295—	60

ains, for Fourth Wheel Seconds, with Fifteen Teeth in Escapement Wheel.

, of th the tre el.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves in.
	6[illegible]	8	70	8	15	7	300	60
	60	8	60	8	15	6	300	60
	45	8	60	6	15	6	300	60
	56	8	60	7	15	6	300	60
	60	6	60	8	15	6	300	60
	70	7	70	7	15	7	300	60
	49	7	60	7	15	6	300	60
	49	6	60	6	15	6	300	60
	45	10	70	8	15	7	300	60
	60	10	60	8	15	6	300	60
4	64	8	70	10	15	7	300	60
4	75	8	60	10	15	6	300	60
3	75	7	70	10	15	7	300	60
5	75	7	60	10	15	6	300	60
4	75	8	54	8	15	6	270	60
0	60	8	54	7	15	6	270	60
4	56	8	54	6	15	6	270	60
3	45	6	54	8	15	6	270	60
0	60	7	68	7	15	7	270	60
0	49	7	54	7	15	6	270	60
3	49	6	54	6	15	6	270	60
4	45	8	48	8	15	6	240	60
0	60	8	48	7	15	6	240	60
8	50	6	48	8	15	6	240	60
4	60	8	48	6	15	6	240	60
0	45	7	56	7	15	7	240	69
0	49	7	48	7	15	6	240	60
8	45	6	48	6	15	6	240	60
0	56	8	48	7	15	6	240	60

rains, for Fourth Wheel Seconds, with Seventeen Teeth in Escapement Wheel.

4	60	8	51	8	17	6	289	60
4	60	8	50	8	17	6	283+	50
0	56	8	51	7	17	6	289	60
0	60	10	50	8	17	6	283+	60
5	64	10	50	8	17	6	283+	60
5	56	10	68	7	17	8	289	[illegible]
5	68	10	68	8	17	8	289	[illegible]
0	75	10	68	10	17	8	289	6

Train of the American Watch Company's Watch.

4	60	8	64	8	15	7	300	60

NOTE.—By use of the foregoing set of Trains, and the rule for sizes of nions, on page 114, all difficulty of calculating is obviated; and at one ew, in case of the accidental loss of a wheel and pinion, may be known e correct size and count of the pinion, and number of teeth in the heel lost.

Valuable Receipts for Goldsmiths.—Standard Gold is compounded of 440 grains of fine gold, and 40 grains (Troy weight, to the oz. alloy ; therefore, when you judge how much gold a piece of work will take, compound it to the standard weight by the following directions : *Assay Weight.* The weight of gold is a pound, which is divided into 12 ozs. each oz. into 24 carats, each carat into 4 grains, and, lastly, each grain into 4 quarters ; then you see the assay quarter-grain, is in reality 1¼ grain Troy.

QUANTITY OF STANDARD GOLD TO COMPOUND AN OZ. OF ANY OF THE FOLLOWING ALLOYS CALCULATED TO THE ¼ OF A GRAIN, AS FOLLOWS.

Carat.	Dwts.	Grs.	Qrs.	ALLOY TO BE ADDED.	Dwts.	Grs.	Qrs.
1	0	21	9		19	2	2
2	1	19	7		18	4	4
3	2	17	5		17	6	6
4	3	15	3		16	8	8
5	4	13	1		15	10	10
6	5	10	10		14	13	1
7	6	8	8		13	15	3
8	7	6	6		12	17	5
9	8	4	4		11	19	7
10	9	2	2		10	21	9
11	10	0	0		10	0	0
12	10	21	9		9	2	2
13	11	19	7		8	4	4
14	12	17	5		7	6	6
15	13	15	3		6	8	8
16	14	13	1		5	10	10
17	15	10	10		4	13	1
18	16	8	8		3	15	3
19	17	6	6		2	17	5
20	18	4	4		1	19	7
21	19	2	2		0	21	9
22	22	0	0				

Sterling Gold Alloy, 78s. per oz.—1. Fine gold, 18 dwt., 1 grs., fine silver, 1 dwt., fine copper, 12 grs. 2. *Dry Colored Gol Alloys.* 17 *Carat.* Fine gold, 15 dwts., fine silver, 1 dwt. 10 grs., fin copper, 4 dwts. 17 grs. 3. *Another*, 18 *Carat.* Fine gold, 1 oz., fin silver, 4 dwts. 10 grs., fine copper, 2 dwts. 5 grs. 4. *Another*, 1 *Carat.* Fine gold, 15 dwts., fine silver, 2 dwts. 4 grs., fine coppe 2 dwts. 19 grs. 5. *Another*, 18 *Carat.* Fine gold, 18 dwts., fin silver, 2 dwts. 18 grs., fine copper, 3 dwts. 18 grs. 6. *Another* 1 *Carat.* Fine gold, 1 oz., fine silver, 2 dwts. 6 grs., fine copper, dwts. 12 grs. 7. *Another*, 20 *Carat* Fine gold, 1 oz , fine silver, dwts., fine copper, 2 dwts. 4 grs. 8. *Another*, 22 *Carat.* Fine gold, 1 dwts., fine silver, 12 grs., fine copper, 1 dwt. 3 grs. 9. *Gold sold for the foregoing Alloys* Take of the alloyed gold you are using, dwt., fine silver, 6 grs. 10. *Alloy for Dry Colored Rings.* Fine gol 1 oz., fire silver, 4 dwts. 6 grs., fine copper, 4 dwts. 6 grs. 11. *Sold for ditto.* Scrap gold, 2 ozs., fine silver, 3 dwts , fine copper, 3 dw 12. *Dry Colored Scrap reduced to* 35*s. Gold.* Colored scrap, 1 9 dwts. 12 grs., fine silver, 2 dwts., fine copper, 17 dwts. 12 gr spelter, 4 dwts.

Dry Coloring for the Foregoing.—Polish your work well a for every 2 ozs. take saltpetre, 8 ozs., alum, 4 ozs., salt, 4 o melt all together in a black lead pot, stirring with a thin iron when dissolving. Use the fire on a forge and urge it well with the bellows, as you can not make it too hot. Your polished work being well cleaned with soda, soap, and hot water, is dried in box sawdust, is afterwards covered with a thin layer of borax; annealed and boiled out, and again dried in box sawdust, and finally hung on platinum or silver wire. When the "color" in the pot assumes a brown yellow flame, the work is dipped in for two or three seconds, and quenched with hot water diluted with muriatic acid, which removes any "color" that may adhere to the work. This ought to produce the desired color, but if it does not, repeat the process, previously drying the work before re-immersion in the "color." The color-pot must be emptied immediately upon the forge, so that it may be ready for future use.

WET COLORED ALLOYS.—1. Fine gold, 1 oz., fine silver, 3 dwts. 12 grs., fine copper, 9 dwts. 2. Fine gold, 1 oz., fine silver, 4 dwts. 12 grs., fine copper, 10 dwts. 3. Fine gold, 1 oz., fine silver, 4 dwts. 12 grs., fine copper, 10 dwts. 12 grs. 4. Fine Gold, 1 oz., fine silver, 4 dwts., fine copper, 9 dwts. 12 grs. 5. *Green Gold for Fancy Work.* Fine gold, 1 oz., fine silver, 6 dwts. 16 grs. 6. *Another Green Gold.* Fine gold, 5 dwts., fine silver, 1 dwt. 12 grs. 7. *Another Green Gold.* Fine gold, 10 dwts., fine silver, 2 dwts. 2 grs. 8. *Red Gold, far fancy work.* Fine gold, 5 dwts., fine copper, 2 dwts. 12 grs. 9. *Another Red Gold.* Fine gold, 5 dwts., fine copper, 1 dwt. 6 grs. 10. *Gold solders for the foregoing Alloys.* Take of the alloyed gold you are using 1 dwt., fine silver, 6 grs., or, 5 grs. silver and 1 gr. copper may be used. 11. *Solder for Repairing.* Gold alloyed, 1 dwt., fine silver, 5 grs., pin brass, 1 gr. 12. *Wet Colored Solder.* Wet colored scrap, 3 ozs., fine silver, 10 dwts., fine copper, 5 dwts. 13. *Gold, 15 carat, cost 56s. or $14 per oz.* Fine gold, 1 oz. 18 dwts., fine silver, 12 dwts. 12 grs., fine copper, 10 dwts. 14. Fine gold, 1 oz. fine silver, 8 dwts. fine copper, 4 dwts. 14. Fine gold, 1 oz., fine silver, 8 dwts., fine copper, 4 dwts. 15. Fine gold, 1 oz., fine silver, 6 dwts., fine copper, 8 dwts. 16. *Gold solder for the last.* Gold scrap, 1 oz., fine silver, 5 dwts. 17. *Gold, good color.* Fine gold, 1 oz., fine silver, 6 dwts., fine copper, 4 dwts. 18. *Gold cost 60s. or $15, good color.* Fine gold, 1 dwt. fine silver, 6 dwts., fine copper, 4 dwts. 19. *Wet colored solder.* Scrap gold, 4 ozs., fine silver, 13 dwts., fine copper, 6 dwts. 16 grs. 20. *To reduce 22 carat into Wet colored Gold.* Gold coins, 4 ozs., 8 dwts., fine silver, 13 dwts., fine copper, 1 oz. 13 dwts. 21. *To reduce 22 carat to ordinary wet colored Gold with scrap.* Coins 1 oz., fine gold, 3 ozs., fine silver, 17 dwts. 12 grs., fine copper, 2 ozs. 1 dwt. 12 grains., scrap, 3 ozs. 1 dwt. 22. *Another way, with scrap.* Coins, 3 ozs. 1 dwt. 6 grs., fine gold, 2 ozs., fine silver, 1 oz. 1 dwt., fine copper, 2 ozs. 11 dwts., scrap, 1 oz. 6 dwts. 18 grs. 23. *Another way with scrap.* Coins, 2 ozs., fine gold, 3 ozs. 3 dwts. 8 grs,, fine silver, 1 oz. 1 dwt 4 grs., fine copper, 2 ozs. 10 dwts. 12 grs., scrap, 1 oz. 5 dwts. 24. *To reduce 22 carat to ordinary wet colored Gold. without scrap.* Coins, 1 oz., fine gold, 8 ozs., fine silver, 2 ozs., fine copper, 4 ozs. 14 dwts. 25. *Another way, without scrap.* Coins, 1 oz., fine gold, 2 ozs., fine silver, 13 dwts., fine copper, 1 oz., 11 dwts. 26. *Another way, without scrap.* Coins, 2 ozs., fine gold, 6 ozs., fine silver, 1 oz. 14 dwts., fine copper, 4 ozs. 2 dwts.

To Wet-Color the foregoing Alloys.—For 5 ozs. of work take saltpetre, 16 ozs., alum, 8 ozs., salt, 8 ozs., all pulverized and muriatic acid, 2 ozs., dissolve the ingredients gradually in a black lead pot. When it boils up, add the acid, and stir the whole with a wooden spoon. Having annealed your work and made it perfectly clean, tie in small parcels with platinum or fine silver wire, and when the color boils up immerse it therein for four minutes, moving it about to ensure a perfect contact with all parts of the surface. Then take it out and rinse it well in boiling water, then immerse in the color again for 1¼ minutes and rinse well once more in fresh hot water. Now add 2 ozs. of fresh hot water to the color in the pot, which will cause it to sink. When it rises put in your work for 1 minute, rinsing in fresh hot water again, when it will begin to brighten. Now immerse your work for half a minute longer, and rinse for the last time in clean hot water, when it will appear of a most beautiful color.

Ordinary wet colored Gold.—Table showing the proportions of Alloy with from one oz. up to ten oz. of Fine Gold.

Fine Gold.			Fine Silver.			Fine Copper.			Total.		
Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.
1	0	0	0	4	12	0	10	12	1	15	0
2	0	0	0	9	0	1	1	0	3	10	0
3	0	0	0	13	12	1	11	12	5	5	0
4	0	0	0	18	0	2	2	0	7	0	0
5	0	0	1	2	12	2	12	12	8	15	0
6	0	0	1	7	0	3	3	0	10	10	0
7	0	0	1	11	12	3	13	12	12	5	0
8	0	0	1	16	0	4	4	0	14	0	0
9	0	0	2	0	12	4	14	12	15	15	0
10	0	0	2	5	0	5	5	0	17	10	0

Ordinary bright gold, table showing the proportion of alloy, with from 1 oz. up to 6 oz, of fine gold.

Fine Gold.			Fine Silver.			Composition.			Total.		
Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts	Grs.
1	0	0	0	5	0	1	8		2	13	0
2	0	0	0	10	0	2	16	0	5	6	0
3	0	0	0	15	0	4	4	0	7	19	0
4	0	0	1	0	0	5	12	0	10	12	0
5	0	0	1	5	0	7	0	0	13	5	0
6	0	0	1	10	0	8	8	0	15	18	0

Composition for the above.—Fine Copper 44 ozs. spelter 8 ozs.

Table of alloys for different qualities of gold.

Quality.	Fine Gold.			Composition.			Total.		
9 Carats.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.
12 "	0	7	12	0	12	12	1	0	0
15 "	0	10	0	0	10	0	1	0	0
18 "	0	12	12	0	7	12	1	0	0
22 "	0	15	0	0	5	0	1	0	0
	0	18	18	0	1	6	1	0	0

OSITION FOR THE ABOVE.—Fine Silver, 3 ozs. 5 dwts. [illegible] grs.
per 8 oz. 12 dwts. 12 grs. Spelter 1 oz. 18 dwts. 6 grs.
YS, CONTINUED. 1. *Pale gold for coloring, Enamelling, or*
g—Fine Gold 1 oz., fine silver 9 dwts., fine copper 2 dwts.,
2. *Another ditto*—Fine gold 1 oz., fine silver 9 dwts., fine
3 dwts., 12 grs. 3. *Another ditto*—Fine gold 1 oz., fine sil-
lwts., fine copper 3 dwts., 12 grs. 4. *Enamelling Gold No.*
gold 1 oz., fine silver 1 dwt., 12 grs., fine copper 2 dwts., 12
. *Enamelling Gold from Sterling*—Sterling 1 oz., fine silver
., fine copper 2 dwts. 6. *Enamelling Gold Solder*—Gold
, 1 dwt., fine silver 4 grs. 7. *Another ditto, cost* 43*s. stg., or*
per oz.—Fine gold 12 dwts., fine silver 7 dwts., 3 grs., fine
6 dwts. 8. *Enamelling Gold No.* 2. *cost* 50*s. stg. per oz.*
gold 1 oz., fine silver 9 dwts., 12 grs., fine copper 7 dwts., 12
. *Enamelling Gold No.* 3.—Fine gold 1 oz., fine silver 14
fine copper 8 dwts. 10. *Enamelling Gold No.* 4.—Fine gold
5 dwts., fine silver 1 oz., 6 dwts., fine copper 1 oz., pin brass
. 11. *Enamelling Gold No.* 5.—Fine gold 1 oz., fine silver
., fine copper 6 dwts. 12. *Enamelling Gold No.* 6. *for trans-*
enamelling—Fine gold 1 oz., fine silver 14 dwts. fine copper
. 13. *Gold solder for enamelled work*—Fine gold 1 oz., fine
1 oz., fine copper 10 dwts., silver solder 8 dwts., 8 grs. 14.
old alloys for polishing, &c., No. 1.—Fine gold 1 oz., fine
3 dwts., fine copper 3 dwts., 12 grs. 15. *Another, No.* 2.—
old 1 oz., fine silver 1 dwt., 20 grs., fine copper 1 dwt., 4 grs.
le 18 *Carat Gold*—Fine gold 1 oz., fine silver 4 dwts., fine
2 dwts., 15 grs. 17. *Another Pale* 18 *Carat Gold*—Fine gold
12 grs., fine silver 3 dwts., 8 grs., fine copper 3 dwts., 8 grs.
le Gold Solder—Gold alloyed 1 dwt., 6 grs., fine silver 1 dwt.
loy for best Pens—Fine gold 1 oz., fine silver 5 dwts., fine cop-
dwts., 18 grs., spelter 1 dwt., 6 grs. 20. *Solder for ditto*—
old 12 dwts., fine silver 7 dwts., 3 grs., fine copper 6 dwts. 21.
n quality pens—Fine gold 1 oz., Composition 1 oz., 13 dwts.
mposition for the last—Fine silver 1 oz., 17 dwts., fine copper
15 dwts., spelter 18 dwts., 20 grs. 23. *Solder for ditto*—Fine
oz., fine silver 2 ozs., pin-brass 1 oz. 24. *Gold for common*
Fine gold 1 oz., fine silver 2 ozs., fine copper 1 oz. 25. *Sol-*
ditto—Fine gold 1 oz., fine silver 2 ozs., pin brass 1 oz. 26.
of Gold with Brass, No. 1.—Fine gold 1 oz., fine silver 5
grs., fine copper 3 dwts., 12 grs., pin brass 18 dwts. 27.
r ditto, No. 2.—Fine gold 1 oz., fine silver 4 dwts., fine cop-
dwts., pin brass 16 dwts. 28. *Another ditto, No.* 3.—Fine
oz., fine silver 5 dwts., 12 grs., fine copper 3 dwts., 12 grs., pin
19 dwts., 6 grs. 29. *Another alloy*—Fine gold 1 oz., fine sil-
lwts., 21 grs., fine copper 9 dwts., 3 grs. composition 5 dwts.
30. *Another ditto*—Fine gold 15 dwts., 9 grs., fine silver 5
19 grs. fine copper 3 dwts. 21 grs. composition 15 dwts. 31.
sition for the last two alloys—Finest copper 1 oz., spelter 5
32. *Solder for foregoing alloys*—Gold alloyed 1 dwt., fine
12 grs. 33. *Imitation Gold costs* 87c *per oz.*—Fine silver 2
dwts., fine copper 1 oz. composition 1 oz., keeps its color
well. 34. *Composition for ditto*—Fine copper 11 ozs., spelter
35. "*California*" *Gold*—Fine gold 5 ozs., 12 dwts. compo-

sition 7 ozs., 17 dwts. 36. *Composition for "California"*—Fine silver 7 ozs., 17 dwts. fine copper 33 ozs. 12 dwts., spelter 5 ozs., 12 dwts. 37. *Medium Gold*—Fine gold 1 oz., fine silver 12 dwts. fine copper 13 dwts. 38. *Bright Gold*—Fine gold 1 oz., fine silver 7 dwts. composition marked No. 34, 1 dwt. 6 grs. 39. *Common Gold, No.* 1.—Fine gold 1 oz., fine silver 8 dwts. composition No. 34. 1 oz., 12 dwts. 41. *Common Gold, No.* 2.—Fine gold 5 dwts. fine silver 3 dwts. 6 grs. fine copper 6 dwts. 12 grs. 42. *Gold for Pins*—Fine gold 1 oz., fine silver 5 dwts. fine copper 1 oz., spelter 5 dwts. 43. *Dry Colored Scrap reduced to* 35*s. or* $8.75 *Gold*—Colored scrap 1 oz., 9 dwts., 12 grs., fine silver 2 dwts., fine copper 17 dwts. 12 grs., spelter 4 dwts. 44. *Alloy for Gold Chains.*—Fine gold 11 dwts., 6 grs., fine silver 2 dwts., 5 grs., fine copper 6 dwts., 13 grs. 45. *Another ditto*—Fine gold 1 oz., fine silver 9 dwts., fine copper 8 dwts 46. *Gold worth* 45*s. stg. or* $11.25—Fine gold 1 oz., composition (see No. 22) 1 oz. 47. *Solder for ditto*—Fine gold 1 oz., fine silver 15 dwts., fine copper 15 dwts. 48. 12 *Carat Gold*—Fine gold 1 oz., fine silver 10 dwts., fine copper 9 dwts., 6 grs. 49. *Common Gold from "California"*—"California," (see No. 35.) 8 ozs. fine silver 13 ozs., 16 dwts., fine copper 6 ozs., 16 dwts. 50. 29*s. or* $7.25 *Gold*—Fine gold 1 oz., 13 dwts., 6 grs., fine silver 1 oz., 12 dwts., 12 grs., fine copper 1 oz., 16 dwts., 6. grs., spelter 4 dwts. Stands nitric acid very well.

ORDINARY BRIGHT GOLD WIRE, TABLE SHOWING THE PROPORTIONS OF ALLOY FROM 1 OZ. UP TO 21 OZ.

Fine Gold.			Fine Silver.			Fine Copper.			Total.		
Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts)	Grs,	Oz.	Dwts.	Grs.
0	5	21	0	6	6	0	6	21	1	0	0
0	11	18	0	14	12	0	13	18	2	0	0
0	17	15	1	1	18	1	0	15	3	0	0
1	15	6	2	3	12	2	1	6	6	0	0
2	12	21	3	5	6	2	1	21	9	0	0
3	10	12	4	7	0	4	2	12	12	0	0
4	8	3	5	8	18	5	3	3	15	0	0
5	4	18	6	10	12	6	3	18	18	0	0
6	3	8	7	12	6	2	4	9	21	0	0

TO RECOVER THE GOLD LOST IN COLORING.—Dissolve a handful of sulphate of iron in boiling water, then add this to your "color" water, it precipitates the small particles of gold. Now draw off the water, being very careful not to disturb the auriferous sediment at the bottom. You will now proceed to wash the sediment from all trace of acid with plenty of boiling water; it will require 3 or 4 separate washings, with sufficient time between each to allow the water to cool and the sediment to settle, before pouring the water off. Then dry in an iron vessel by the fire and finally fuse in a covered skittle pot with a flux as directed on page 244. See "*To Fuse Gold Dust.*" For *Silversmiths Compositions.* See page 284

To Tighten a Ruby Pin.—Set the ruby pin in asphaltum varsh. It will become hard in a few minutes, and be much firmer d better than gum shellac, as generally used.

To Temper Brass, or to Draw its Temper.—Brass is rendered rd by hammering or rolling; therefore, when you make a thing brass necessary to be in temper, you must prepare the material fore shaping the article. Temper may be drawn from brass by ating it to a cherry red, and then simply plunging it into water, e same as though you were going to temper steel.

To Temper Drills.—Select none but the finest and best steel for ur drills. In making them, never heat higher than a cherry red, d always hammer till nearly cold. Do all your hammering in e way, for if, after you have flattened your piece out, you ttempt to hammer it back to a square or a round, you spoil it. hen your drill is in proper shape, heat it to a cherry red, and rust it into a piece of resin or into quicksilver. Some use a soluon of cyanuret potassa and rain-water for tempering their drills, ut, for my part, I have always found the resin or quicksilver to ork best.

To Temper Gravers.—Gravers, and other instruments larger an drills, may be tempered in quicksilver as above; or you may e lead instead of quicksilver. Cut down into the lead, say half n inch; then, having heated your instrument to a light cherry d, press it firmly into the cut. The lead will melt around it, and n excellent temper will be imparted.

Other Methods to Temper Case Springs.—Having fitted the ring into the case according to your liking, temper it hard by eating and plunging into water. Next polish the small end so at you may be able to see when the color changes; lay it on a iece of copper or brass plate, and hold it over your lamp, with the laze directly under the largest part of the spring. Watch the polhed part of the steel closely, and when you see it turn blue, remove e plate from the lamp, letting all cool gradually together. When ol enough to handle, polish the end of the spring again, place it n the plate, and hold it over the lamp as before. The third bluing f the polished end will leave the spring in proper temper. Any teel article to which you desire to give a spring temper may be reated in the same way.

Another process, said to be good, is to temper the spring as in the rst instance; then put it into a small iron ladle, cover it with inseed oil, and hold over a lamp till the oil takes fire. Remove he ladle, but let the oil continue to burn until nearly all consumed, hen blow out, re-cover with oil, and hold over the lamp as before. The third burning out of the oil will leave the spring in the right emper.

To Temper Clicks, Ratchets, &c.—Clicks, ratchets, or other steel articles requiring a similar degree of hardness, should be tempered in mercurial ointment. The process consists in simply heating to a cherry red and plunging into the ointment. No other mode will combine toughness and hardness to such an extent.

To Draw the Temper from Delicate Steel Pieces without Springing them.—Place the articles from which you desire to draw the temper into a *common iron* clock key. Fill around it with brass or iron filings, and then plug up the open end with a steel, iron, or brass plug, made to fit closely. Take the handle of the key with your pliers and hold its pipe into the blaze of a lamp till near hot, then let it cool gradually. When sufficiently cold to handle, remove the plug, and you will find the article with its temper fully drawn, but in all other respects just as it was before.

You will understand the reason for having the article thus plugged up while passing it through the heating and cooling process, when I tell you that springing always results from the action of changeable currents of atmosphere. The temper may be drawn from cylinders, staffs, pinions, or any other delicate pieces, by this mode with perfect safety.

To Temper Staffs, Cylinders, or Pinions, without Springing them.—Prepare the articles as in the preceding process, using a steel plug. Having heated the key-pipe to a cherry red, plunge it into water; then polish the end of your steel plug, place the key upon a plate of brass or copper, and hold it over your lamp with the blaze immediately under the pipe till the polished part becomes blue. Let cool gradually, then polish again. Blue and cool a second time, and the work will be done.

To Draw the Temper from part of a Small Steel Article.—Hold the part from which you wish to draw the temper with a pair of tweezers, and with your blow-pipe direct the flame upon them—not the article—till sufficient heat is communicated to the article to produce the desired effect.

To Blue Screws Evenly.—Take an old watch barrel and drill as many holes into the head of it as you desire to blue screws at a time. Fill it about one-fourth full of brass or iron filings, put in the head, and then fit a wire, long enough to bend over for a handle, into the arbor holes—head of the barrel upwards. Brighten the heads of your screws, set them point downwards, into the holes already drilled, and expose the bottom of the barrel to your lamp till the screws assume the color you wish.

To Remove Bluing from Steel.—Immerse in a pickle composed of equal parts muriatic acid and elixir vitrol. Rinse in pure water, and dry in tissue paper.

To Make Diamond Broaches.—Make your broaches of brass the size and shape you desire; then, having oiled them slightly, roll their points into fine diamond dust till entirely covered. Hold them then on the face of your anvil, and tap with a light hammer till the grains disappear in the brass. Great caution will be necessary in this operation. Do not tap heavy enough to flatten the broach. Very light blows are all that will be required; the grains will be driven in much sooner than one would imagine. Some roll the broach between two smooth pieces of steel to imbed the diamond dust. It is a very good way, but somewhat more wasteful of the dust. Broaches made on this plan are used for dressing out jewels.

Jewelling.—In using the broaches, press but lightly into the jewel hole, and turn the broach rapidly with the fingers. For polishing, use a bone or ivory point, lightly coated with the finest diamond dust and oil, and while using it with the one hand, accompany the *motion* with a slight oscillating motion of the other hand, in which the jewel is held. This will ensure a more even polish to the hole, with less liability to press the jewel out of its place in the plate, than if held firm and steady.

To make Polishing Broaches.—These are usually made of ivory, and used with diamond dust, loose, instead of having been driven in. You oil the broach lightly, dip it into the finest diamond dust, and proceed to work it into the jewel the same as you do the brass broach. Unfortunately, too many watchmakers fail to attach sufficient importance to the polishing broach. The sluggish motion of watches now-a-days is more often attributable to rough jewels than to any other cause.

To make Diamond Files.—Shape your file of brass, and charge with diamond dust, as in case of the mill. Grade the dust in accordance with the coarse or fine character of the file desired.

To make Pivot Files.—Dress up a piece of wood file-fashion, about an inch broad, and glue a piece of fine emery paper upon it. Shape your file then, as you wish it, of the best cast steel, and before tempering pass your emery paper heavily across it several times, diagonally. Temper by heating to a cherry red, and plunging into linseed oil. Old worn pivot files may be dressed over and made new by this process. At first thought one would be led to regard them too slightly cut to work well, but not so. They dress a pivot more rapidly than any other file.

To make Burnishers.—Proceed the same as in making pivot files, with the exception that you are to use fine flour of emery on a slip of oiled brass or copper, instead of the emery paper. Burnishers which have become too smooth may be improved vastly with the flour of emery as above without drawing the temper.

To Prepare a Burnisher for Polishing.—Melt a little bees'-wax on the face of your burnisher. Its effect then on brass or other finer metals, will be equal to the best buff. A small burnisher prepared in this way is the very thing with which to polish up watch wheels. Rest them on a piece of pith while polishing.

To Make a Diamond Mill.—Make a brass chuck or wheel, suitable for use on a foot-lathe, with a flat even surface or face of about 1½ or 2 inches in diameter; then place a number of the coarsest pieces of your diamond-dust on different parts of its face, and with a smooth-faced steel hammer drive the pieces of dust all evenly into the brass to nearly or quite level with the surface. Your mill, thus prepared, is now used for making pallet jewels or for grinding stone and glass of any kind, For polishing, use a bone or boxwood chuck or wheel, of similar form to your mill, and coat it lightly with the finest grade of your diamond-dust and oil; with this a beautiful polish may be given to the hardest stone.

To make Diamond Dust.—Place a few small pieces of common or cheap diamond on a block of hard polished steel, in a suitable vessel, and cover it with water to prevent flying or scattering, then place a flat steel punch on each piece separately, and strike the punch with a mallet or hammer, with sufficient force to crush the diamond. When reduced sufficiently fine in this way, the dust may be collected and dried for use; after drying, it may be graduated for different purposes, by mixing it with a little watch oil; when agitated, the finest particles will float near the surface, while the coarsest pieces will sink at once to the bottom; and thus by decanting the oil in which the dust floats, as many grades of fineness as desired may be obtained. The dust may be separated from the oil by pouring on a piece of smooth clean paper; the paper will absorb the oil, or allow it to filter through, while the dust will remain on the surface; but to prevent waste, the better way is to leave it in the oil, and use it directly therefrom as required, or the oil may be washed out of the dust with alcohol.

To POLISH STEEL.—Take crocus or oxide of tin and graduate it in the same way as in preparing diamond dust, and apply it to the steel by means of a piece of soft iron or bell metal, made proper form, and prepared with flour of emery, same as for pivot burnishers; use the coarsest of the crocus first, and finish off with the finest. To iron or soft steel a better finish may be given by burnishing than can be imparted by the use of polishing powder of any kind whatever.

TO DETERMINE THE EXACT FOCAL DISTANCE OF SPECTACLE GLASSES.—Place the end of a measure of thirty or forty inches in length against a smooth wall, or other suitable ground, in plain view of some well-defined object a few rods distant, as for instance a building or window on the opposite side of the street. Then place the edge of your lens on the measure, and move it backward or forward until a spectrum is formed, or, in other words, until a clear and distinct outline of the distant object is produced on the ground against which your measure rests. This point will represent sufficiently near, for all practical purposes, the exact focal distance of the lens, and will correspond in inches with the number on all properly marked convex spectacles. For mending fine steel spectacle frames, use the best gold in preference to silver or brass solder.

TO WITHDRAW MAGNETISM FROM STEEL AND QUICKSILVER FROM METALS.—A degree of heat, considerably below a red heat, will expel quicksilver from metals in the form of vapor. To withdraw magnetism from steel, &c., cover the article with the juice of common garlic, and then warm it over a spirit lamp. Do not heat sufficiently to draw the temper or blue the steel.

TO PROTECT STONE OR PASTE SET-RINGS, &C., FROM DAMAGE BY HEAT WHILE MENDING.—Cover the head or set part of the ring, or other article, with a thick coating of dampened plaster of Paris, or simply imbed the same in a piece of green apple or potatoe. This will obviate all danger from heat during the process of mending. A light coat of dampened plaster of Paris will, if properly applied, also protect fine Etruscan jewellery, &c., from change of color while mending.

TO FROST WATCH PLATES.—Watch plates are frosted by means of fine brass wire scratch brushes fixed in a lathe, and made to revolve at great speed, the end of the wire brushes striking the plate producing a beautiful frosted appearance.

TO PREVENT WATCHES LOSING TIME FROM ACTION OF PENDULUM SPRING.—Pin the pendulum spring into the stud, so that that part, the part of the eye immediately emerging from the collet, and the *centre of the* collet, are in a line; then you will have the spring *pinned in, in* equal terms, as it is called by those who are versed in the higher branches of springing. Bring the watch to time by adding to or taking from the balance, and poise it; try the watch with the 12 up for 2 hours, then with the 6 up for 2 hours, then lying down for the same time; the trials here described will be sufficient if the watch has seconds; keep the curb pins close so as to allow the spring only a little play; the vibration of the balance should be 1¾ turn or 1½ lying.

To restore Watch Dials.—If the dial be painted, clean the figure off with spirits of wine, or anything else that will render the dial perfectly clean; then heat it to a bright red, and plunge it into a strong solution of cyanide of potassium, then wash in soap and water, and dry in box dust. Repeat if not a good color. Indian ink, ground with gum water, will do for the figures.

To make a Watch Keep good Time when the Cylinder edges are worn off, by altering the Escapement without putting a new Cylinder in.—Look at the cylinder, and see if there is room, either above or below the old wears, to shift the action of the wheel. If the wheel holes are brass, making one a little deeper, and putting a shallower one on the other side, will perhaps be sufficient. This must be done according as you want your wheel up or down. If the holes are stone, shift your wheel on the pinion by a new collet, or turning away more of the old one, as the case may require. If you raise your wheel see that it works free of plate and top of cylinder, and that the web of wheel clears the top of passage. This last fault may be altered by polishing passage a little wider, if rub be slight. If shifted downwards, see to freedom at bottom of cylinder, &c.

Poising Watch Balance.—This may be done with sufficient accuracy by scraping one arm of the callipers with a file when the balance is set in motion. This will cause the heaviest part to settle downwards with certainty, observing always that the pivots are nicely rounded and formed at the ends. In some cases it becomes necessary to put a balance out of poise, in order to make the watch go equally in various positions. The rule for this is: to make the watch gain, the balance should be heaviest on the lower side when hanging up; to make it lose, the reverse.

Cuckoo Clocks.—The sound is produced by a wire acting on a small bellows which is connected with two small pipes, like organ pipes.

To preserve Pinions or Bearings from Corrosion and Rust.—In case of the lower centre bearing under the cannon pinion corroding or rusting, when you clean the watch, be particular to take the central wheel off. Clean it thoroughly: if the pivot is scratched, polish it, then make a little hollow in the top hole; put good fresh oil on it, and the pivot will not corrode or rust for two or three years. As to the other pivots in the watch, they should all be thoroughly cleaned, and old oil cleaned out; then if no dust gets in, and no accident happens the watch, it will run for years.

The German method of Polishing Steel is performed by the use of crocus on a buff wheel. Nothing can exceed the surpassing beauty imparted to steel or even cast iron by this process.

To Clean a Clock.—Take the movement of the clock "to *pieces.*" *Brush* the wheels and pinions thoroughly with a stiff coarse brush; also the plates into which the trains work. Clean the pivots well by turning in a piece of cotton cloth held tightly between your thumb and finger. The pivot holes in the plates are generally cleansed by turning a piece of wood into them, but I have always found a strip of cloth or a soft cord drawn tightly through them to act the best. If you use two cords, the first one slightly oiled, and the next dry, to clean the oil out, all the better. Do not use salt or acid to clean your clock—it can do no good, but may do a great deal of harm. Boiling the movement in water, as is the practice of some, is also foolishness.

To Bush.—The hole through which the great arbors, or winding axles, work, are the only ones that usually require bushing. When they have become too much worn, the great wheel on the axle before named strikes too deeply into the pinions above it, and stops the clock. To remedy this, bushing is necessary, of course. The most common way of doing it is to drive a steel point or punch into the plate just above the axle hole, thus forcing the brass downwards until the hole is reduced to its original size. Another mode is to solder a piece of brass upon the plate in such a position as to hold the axle down to its proper place. If you simply wish your clock to run, and have no ambition to produce a bush that will look workmanlike, about as good a way as any is to fit a piece of hard wood between the post which comes through the top of the plate and the axle. Make it long enough to hold the axle to its proper place, so that the axle will run on the end of the grain. Cut notches where the pivots come through, and secure by wrapping around it and the plate a piece of small wire, or a thread. I have known clocks to run well on this kind of bushing, botchified as it may appear, for ten years.

To Remedy Worn Pinions.—Turn the leaves or rollers, so the worn places upon them will be towards the arbor or shaft, and fasten them in that position. If they are "rolling pinions," and you cannot secure them otherwise, you had better do it with a little soft solder.

To Oil Properly.—Oil only, and very lightly, the pallets of the verge, the steel pin upon which the verge works, and the point where the loop of the verge wire works over the pendulum wire. Use none but the best watch oil. Though you might be working constantly at the clock-repairing business, a bottle costing you but twenty-five cents would last you two years at least. You can buy it at any watch-furnishing establishment.

To Make the Clock Strike Correctly.—If not very cautious in putting up your clock, you will get some of the striking-train wheels in wrong, and thus produce a derangement in the striking. If this should happen, prize the plates apart on the striking side, slip the pivots of the upper wheels out, and having disconnected them from the train, turn them part around and put them back. If still not right, repeat the experiment. A few efforts at most will get them to working properly.

A Defect to look after.—Always examine the pendulum-wire at the point where the loop of the verge wire works over it. You will generally find a small notch, or at least a rough place worn there. Dress it out perfectly smooth, or your clock will not be likely to work well. Small as this defect may seem, it stops a large number of clocks.

FIGURES ON GOLD AND SILVER DIALS.—Hold a small piece of copper over a gas flame for a few minutes till it is coated with soot; clear this off on to a piece of finely ground glass, add fat oil and a small quantity of oil of spike lavender, and grind up; paint with a small camel hair pencil.

GOLD.—To find the number of carats of gold in an object, first weigh the gold and mix with seven times its weight in silver. This alloy is beaten into thin leaves, and nitric acid is added; this dissolves the silver and copper. The remainder (gold) is then fused and weighed; by comparing the first and last weights the number of carats of pure gold is found. This operation is always repeated several times, and if any difference occurs in the result, all is done over again.

JEWELLERS' ALLOYS.—*Eighteen-carat gold for rings.*—Gold coin, 19½ gr.; pure copper, 3 gr.; pure silver, 1½ gr. *Cheap gold, twelve-carat.*—Gold coin, 25 gr.; pure copper, 13½ gr.; pure silver, 7½ gr. *Very cheap four-carat gold.*—Copper, 18 parts; gold, 4 parts: silver, 2 parts. *Imitations of gold.*—1. Platina, 4 dwt.; pure copper, 2¼ dwt.; sheet-zinc, 1 dwt.; block-tin, 1¾ dwt.; pure lead, 1½ dwt. If this should be found too hard or brittle for practical use, re-melting the composition with a little sal-ammoniac will generally render it malleable as desired. 2. Platina, 2 parts; silver, 1 part; copper, 3 parts. These compositions, when properly prepared, so nearly resemble pure gold that it is very difficult to distinguish them therefrom. A little powdered charcoal, mixed with metals while melting, will be found of service. *Best oroide of gold.*—Pure copper, 4 oz.; sheet-zinc, 1¾ oz.; magnesia, ⅜ oz.; sal-ammonia, $\frac{1}{32}$ oz., quick-lime, $\frac{9}{32}$ oz.; cream tartar, ⅜ oz. First melt the copper at as low a temperature as it will melt; then add the zinc, and afterwards the other articles, in powder, in the order named. Use a charcoal fire to melt these metals.

BUSHING ALLOY FOR PIVOT-HOLES, &C.—Gold coin, 3 dwt.; silver, 1 dwt. 20 gr.; copper, 3 dwt. 20 gr.; palladium, 1 dwt. The best composition known for the purpose named.

GOLD SOLDER FOR FOURTEEN TO SIXTEEN-CARAT WORK.—Gold coin, 1 dwt.; pure silver, 9 gr.; pure copper, 6 gr.; brass, 3 gr. *Darker solder.*—Gold coin, 1 dwt.; pure copper, 8 gr.; pure silver, 5 gr.; brass, 2 gr.; melt together in charcoal fire.

SOLDERS, FOR GOLD.—Gold, 6 dwts.; silver, 1 dwt. copper, 2 dwts. **SOFT GOLD SOLDER.**—Gold, 4 parts; silver, 1 part; copper, 1 part.

SOLDERS FOR SILVER.—(For the use of jewellers.)—Fine silver, 19 dwts.; copper, 1 dwt.; sheet brass, 10 dwts.

WHITE SOLDER FOR SILVER.—Silver, 1 oz.; tin, 1 oz.

SILVER SOLDER, FOR PLATED METAL.—Fine silver, 1 oz.; brass, 10 dwts.

SOLDERS.—*For Steel Joints.* Silver, 19 parts; copper, 1 part; brass, 2 parts; melt all together. *Hard Solder.*—Copper, 2 parts; zinc, 1 part; melt together. *For Gold.*—1. Silver, 7 parts; copper, 1 part, with borax. 2. Gold, 2 parts; silver, 1 part; copper, 1 part. 3. Gold, 3 parts; silver, 3 parts; copper, 1 part; zinc, ⅛ part. *For Silver.*—Silver, 2 parts; brass, 1 part, with borax; or, silver, 4 parts; brass, 3 parts; zinc, $\frac{1}{18}$ part, with borax *For Brass.*—Copper, 3 parts; zinc, 1 part, with borax. *For Platina.*—Gold, with borax. *For Iron.*—The best solder for iron is good tough brass, with a little borax. *For Copper.*—Brass, 6 parts; zinc, 1 part; tin, 1 part; melt all together, mix well, and pour out to cool.

COLD SOLDERS.—1. Copper, 24.24 parts; silver, 27.57 parts; gold, 48.19 parts. 2. *Enamel Solder.*—Copper, 25 parts; silver, 7.07 parts; gold, 67.93 parts. 3. Copper, 26.25 parts; zinc, 6.25 parts; silver, 31.25 parts; gold, 36.25 parts. 4. *Enamel Solder.*—Silver, 19.57 parts; gold, 80.43 parts.

SOLDER.—*For 22 carat gold.*—Gold of 22 carats, 1 dwt.; silver, 2 gr.; copper, 1 gr. *For* 18 *carat gold.*—Gold, of 18 carats, 1 dwt; silver, 2 gr.; copper, 1 gr.

For cheaper gold.—Gold, 1 dwt.; silver, 10 gr.; copper, 8 gr.

Cheaper still.—Fine gold, 1 dwt.; silver, 1 dwt.; copper, 1 dwt.

SILVER SOLDERS.—1. (*hard.*) Copper, 30 parts; zinc, 12.85 parts; silver, 57.15 parts. 2. Copper, 23.33 parts; zinc, 10.00 parts; silver, 66.67 parts. 4. Copper, 26.66 parts; zinc, 10.00 parts; silver, 63.34 parts. 4 (*soft.*) Copper, 14.75 parts; zinc, 8.20 parts; silver, 77.05 parts. 5. Copper, 22.34 parts; zinc, 10.48 parts; silver, 67.18 parts. 6. Tin, 63.00 parts; lead, 37 parts.

COLORED GOLD.—1. *Full red gold.*—Gold, 5 dwt.; copper, 5 dwt. 2. *Red gold.*—Gold, 10 dwt.; silver, 1 dwt.; copper, 4 dwt. 3. *Green Gold.*—Gold, 5 dwt.; silver, 21 gr. 4. *Gray gold.*—Gold, 3 dwt. 15 gr.; silver, 1 dwt. 9 gr. 5. *Blue gold.*—Gold, 5 dwt.; steel filings, 5 dwt. 6. *Antique gold, greenish-yellow color.*—Gold, 18 dwt. 9 gr.; silver, 21 gr.; copper, 18 gr. These all require to be submitted to the process of wet-coloring. 7. *Factitious gold, very bright.*—Copper, 16 parts; platina, 7 parts; zinc, 1 part; fused together.

ALLOYS FOR GOLD.—1. *Red gold*—Copper, 66.67 parts; gold, 33.33 parts. 2. *Yellow gold.*—Copper, 12.50 parts; silver, 37.50 parts; gold, 50 parts. 3. *Green gold.*—Silver, 25 parts; gold, 75 parts. 4. *Yellow gold.*—Silver, 66.67 parts; gold, 33.33 parts. 5. *Gray gold.*—Silver, 5.89 parts; gold, 88.23 parts; iron, 5.89 parts. 6. *Dentists' gold.*—Silver, 8.34 parts; platinum, 66.67 parts; gold, 24.29 parts. 7. *English gold coin.*—Copper, 8.34 parts; gold, 91.66 parts. *American gold coin.*—Copper, 10 parts; gold, 90 parts. French gold coin same as American.

ALLOYS FOR SILVER COIN AND PLATE.—1 *English standards.*—Copper, 7.50 parts; silver, 92.50 parts. 2. *American ditto.*—Copper, 10 parts; silver, 90 parts. French, the same.

GILDING METAL for common jewellery is made by mixing 4 parts copper with one of calamine brass. Sometimes 1 lb. copper, with 6 oz. of brass.

DENTISTS' PLATE.—No. 1 Gold, 20 dwts.; silver, 1 dwt.; copper, 2 dwts. 2. Gold, 21, silver, 2; copper, 1.

JEWELLERS' SOLDERING FLUID.—Muriatic acid, ½ pt.; grain zinc, 1½ oz. Dissolve, and add a little common solder and sal-ammoniac.

GOLD FOR SPRINGS.—Gold, 18 dwts. 12 grs.; silver, 6 dwts.; copper, 5 dwts.

Jewellers' Gold Compositions.—*Common Gold:* Silver, 1 part; Spanish copper, 16 parts; gold, 2 parts; mix. *Ring Gold:* Spanish copper, 6 parts; silver, 3 parts; gold, 5 parts; mix. *Manheim Gold:* copper, 3 parts; zinc, 1 part. Melt, and stir well. *Mosaic Gold:* copper and zinc, equal parts; melt at the lowest temperature that will fuse the former, then mix by stirring, and add 5 per cent. more zinc. *Parker's Mosaic Gold:* copper, 100 parts; zinc, 54 parts. *For common Jewellery:* copper, 3 parts; 1 of old brass, and 4 oz. of tin to every lb. of copper.

Factitious Gold.—Copper, 16 parts; platinum, 7 parts; zinc, 1 part; fused together. This alloy resembles gold of 16 carats fine, or ⅔, and will resist the action of nitric acid, unless very concentrated and boiling.

Harmstadt's True Imitation of Gold is stated not only to resemble gold in color, but also in specific gravity and ductility. Platinum, 16 parts; copper, 7 parts; zinc, 1 part; put it in a crucible, cover with charcoal powder, and melt into a mass.

Do. of Silver.—Copper, ¼ oz.; brass, 2 oz.; pure silver, 3 oz.; bismuth, 2 oz.; saltpetre, 2 oz.; common salt, 1 oz.; arsenic, 1 oz.; potash, 1 oz.; melt in a crucible with powdered charcoal. This compound, was by a German chemist for unlawful purposes, was so perfect that he was never discovered.

Artificial Gold.—This is a new metallic alloy which is now very extensively used in France as a substitute for gold. Pure copper, 100 parts; zinc, or, preferably, tin, 17 parts.; magnesia, 6 parts; sal-ammoniac, 3-6 parts; quick-lime, ⅛ part; tartar of commerce, 9 parts; are mixed as follows: The copper is first melted, and the magnesia, sal-ammoniac, lime and tartar are then added separately, and by degrees, in the form of powder; the whole is now briskly stirred for about ½ an hour, so as to mix thoroughly; and then the zinc is added in small grains by throwing it on the surface, and stirring till it is entirely fused: the crucible is then covered, and the fusion maintained for about 35 minutes. The surface is then skimmed, and the alloy is ready for casting. It has a fine grain, is malleable, and takes a splendid polish. It does not corrode readily, and, for many purposes, is an excellent substitute for gold. When tarnished, its brilliancy can be restored by a little acidulated water. If tin be employed instead of zinc, the alloy will be more brilliant. It is very much used in France, and must ultimately attain equal popularity here.

New French Patent Alloy for Silver.—Messieurs De Ruolz & Fontenay have invented the following alloy, which may be used for almost all purposes in which silver is usually applied. Silver, 20 parts; purified nickel, 28 parts; copper, 52 parts. Melt the copper and nickel in the granular state, then introduce the silver. The flux to be employed is charcoal and borax, both in the state of powder; and the ingots obtained are to be rendered malleable by annealing for a considerable time in powdered charcoal.

English Standard for Silver.—Pure silver, 11 oz. 2 dwts.; copper, 22 dwts.: melt.

Silver Imitations.—Copper, 1 lb.; tin, ¾ oz.; melt. This composition will roll and ring very near to silver. *Britannia Metal:* copper, 1 lb.; *tin, 1 lb.*; regulus of antimony, 2 lbs.; melt together, with or without a little bismuth. *Genuine German Silver:* iron, 2½ parts; nickel, 31¼ parts; zinc, 25¼ parts; copper, 40½ parts; melt. *Fine White German Silver:* iron, 1 part; nickel, 10 parts; zinc, 10 parts; copper, 20 parts; melt. *Pinchbeck:* copper, 5 parts; zinc, 1 part; melt the copper, then add the zinc. *Jewellers' Metal:* copper, 30 parts; tin, 7 parts; brass, 10 parts; mix.

French Gold Plate.—1. Gold, 92 parts; copper, 8 parts. 2. Gold, 84 parts; copper, 16 parts. 3. Gold, 75 parts; copper, 25 parts.

Bidery.—Copper, 48.48 parts; tin, 6.60 parts; zinc, 33.80 parts; lead, 12.12 parts.

Best Brass for Clocks.—Rose copper, 85 parts; zinc, 14 parts; lead, 1 part.

Alloy for Watch Pinion Sockets.—Gold, 31 parts; silver, 19 parts; copper, 39 parts; palladium, 1 part.

Pickle, for Frosting and Whitening Silver Goods.—Sulphuric acid, 1 dr.; water, 4 oz.; heat the pickle, and immerse the silver in it until frosted as desired; then wash off clean, and dry with a soft linen cloth, or in fine clean sawdust. For whitening only, a smaller proportion of acid may be used.

Etruscan Gold Coloring.—Alum, 1 oz.; fine table-salt, 1 oz.; saltpetre (powdered), 2 oz.; hot rain-water, sufficient to make the solution, when dissolved, about the consistency of thick ale; then add sufficient muriatic acid to produce the color desired. The degree of success must always depend, in a greater or less degree, upon the skill or judgment of the operator. The article to be colored should be from fourteen to eighteen carats fine, of pure gold and copper only, and be free from coatings of tin or silver solder. The solution is best used warm, and when freshly made the principle on which it acts is to eat out the copper alloy from the surface of the article, leaving thereon pure, frosted gold only. After coloring, wash off, first in rain-water, then in alcohol, and dry without rubbing, in fine clean sawdust. Fine Etruscan jewellery, that has been defaced or tarnished by use, may be perfectly renewed by the same process.

Tarnish on Electro-Plate Goods may be removed by immersing the article from one to ten or fifteen minutes, or until the tarnish has been removed, but no longer, in the following solution: Rain-water, 2 gals.; cyanuret potassa, ½ lb.; dissolve, and put into a stone jug or jar and closely cork. After immersion, the articles must be taken out and thoroughly rinsed in two or three waters, then dried wito a soft linen cloth, or, if frosted or chased work, with fine clean sawdust. Tarnished jewellery may be speedily restored by this process; but make sure work of removing the alkali, otherwise it will corrode the goods.

A Bright Gold Tinge may be given to silver by steeping it for a suitable length of time in a weak solution of sulphuric acid and water strongly impregnated with iron-rust.

To Refine Gold.—If you desire to refine your gold from the baser metals, swedge or roll it out very thin, then cut into narrow strips and curl up so as to prevent its lying flatly. Drop the pieces thus prepared into a vessel containing good nitric acid, in the proportion of acid, 2 oz., and pure rain-water, ½ oz. Suffer to remain until thoroughly dissolved, which will be the case in from ½ an hour to 1 hour. Then pour off the liquid carefully, and you will find the gold, in the form of a yellow powder, lying at the bottom of the vessel. Wash this with pure water till it ceases to have an acid taste, after which you may melt and cast into any form you choose. Gold treated in this way may be relied on as perfectly pure.

In melting gold use none other than a charcoal fire, and during the process sprinkle saltpetre and potash into the crucible occasionally. Do not attempt to melt with stone coal, as it renders the metal brittle and otherwise imperfect.

To Refine Silver.—Dissolve in nitric acid as in the case of the gold. When the silver has entirely disappeared, add to the 2½ oz. of solution nearly 1 quart of pure rain-water. Sink, then, a sheet of clean copper into it; the silver will collect rapidly upon the copper, and you can scrape it off and melt into bulk at pleasure.

In the event of your refining gold in accordance with the foregoing formula, and the impurity was silver, the only steps necessary to save the latter would be to add the above named proportion of water to the solution poured from the gold, and then to proceed with your copper plate as just directed.

To Refine Copper.—This process differs from the one employed to refine silver in no respects save the plate to be immersed; you use an iron instead of a copper plate to collect the metal.

If the impurities of gold refined were both silver and copper, you might, after saving the silver as above directed, sink your iron plate into the solution yet remaining, and take out the copper. The parts of alloyed gold may be separated by these processes, and leave each in a perfectly pure state.

Cold Silvering of Metals.—Mix 1 part of chloride of silver with 3 parts of pearlash, 1½ parts common salt, and 1 part whiting; and well rub the mixture on the surface of brass or copper (previously well cleaned), by means of a piece of soft leather, or a cork moistened with water and dipped in the powder. When properly silvered, the metal should be well washed in hot water, slightly alkalized; then wiped dry.

To Heighten the Color of Yellow Gold.—Saltpetre, 6 oz.; green copperas, 2 oz.; white vitriol and alum, of each 1 oz. If wanted redder, a small quantity of blue vitriol must be added.

For Green Gold.—Saltpetre, 1 oz. 10 dwts.; sal-ammoniac, 1 oz. 4 dwts.; Roman vitriol, 1 oz. 4 dwts.; verdigris, 18 dwts.

To Clean Gilt Jewellery.—Boiling water in a clean flask, ½ pt.; cyanide of potassium, 1 oz.; shake the flask to dissolve the potassium. Add, when cold, liquor ammonia, ½ oz.; rectified alcohol, 1 oz. Used by brushing over gilded articles.

Coloring Jewellery.—Boil the articles in a dilute solution of terchloride of gold, to which some bicarbonate of soda has been added.

Coloring of Gilding.—Defective colored gilding may also be improved by the help of the following mixture: nitrate of potash, 3 oz.; alum, 1½ oz.; sulphate of zinc, 1½ oz.; common salt, 1½ oz. These ingredients are to be put into a small quantity of water to form a sort of paste, which is put upon the articles to be colored; they are then placed upon an iron plate over a clear fire, so that they will attain nearly to a black heat, when they are suddenly plunged into cold water; this gives them a beautiful high color. Different hues may be had by a variation in the mixture.

For Red Gold.—To 4 oz. melted yellow wax, add, in fine powder, 1½ oz. of red ochre; 1½ oz. verdigris, calcined till it yields no fumes; and ½ oz. of calcined borax. Mix them well together. Dissolve either of above mixtures in water, as the color is wanted, and use as required.

Gold is taken from the surface of silver by spreading over it a paste made of powdered sal-ammoniac, with aquafortis, and heating it till the matter smokes, and it is nearly dry; when the gold may be separated by rubbing it with a scratch brush.

Moulds and Dies.—Copper, zinc, and silver in equal proportions; melt together under a coat of powdered charcoal, and mould into the form you desire. Bring them to nearly a white heat, and lay on the thing you would take the impression of, press with sufficient force, and you will get a perfect and beautiful impression.

Polishing Powder for Gold and Silver.—Rock alum burnt and finely powdered, 5 parts; levigated chalk, 1 part. Mix; apply with a dry brush.

Silver-Plating Fluid.—Dissolve 1 ounce of nitrate of silver, in crystals, in 12 ounces of soft water; then dissolve in the water 2 oz. cyanuret of potash; shake the whole together, and let it stand till it becomes clear. Have ready some half-ounce vials, and fill half full of Paris white, or fine whiting; and then fill up the bottles with the liquor, and it is ready for use. The whiting does not increase the coating powder; it only helps to clean the articles, and save the silver fluid, by half filling the bottles.

Jewellers' Armenian Cement.—Isinglass soaked in water and dissolved in spirit, 2 oz. (thick); dissolve in this 10 grs. of very pale gum ammonia (in tears) by rubbing them together; then add 6 large tears of gum mastic, dissolved in the least possible quantity of rectified spirit. When carefully made, this cement resists moisture and dries colorless. Keep in a closely stopped phial.

Jewellers' Turkish Cement.—Put into a bottle 2 oz. of isinglass and 1 oz. of the best gum arabic; cover them with proof spirits, cork loosely, and place the bottle in a vessel of water, and boil it till a thorough solution is effected; then strain for use; best cement known.

Revive for Old Jewellery.—Dissolve sal-ammoniac in urine and put the jewellery in it for a short time; then take it out, and rub with chamois leather, and it will appear equal to new.

To Recover Gold from Gilt Metal.—Take a solution of borax water, apply to the gilt surface, and sprinkle over it some finely powdered sulphur; make the article red hot, and quench it in water; then scrape off the gold, and recover it by means of lead.

To Separate Gold and Silver from Lace, &c.—Cut in pieces the gold or silver lace, tie it tightly, and boil it in soap lye till the size appears diminished; take the cloth out of the liquid, and, after repeated rinsings in cold water, beat it with a mallet to draw out all the alkali Open the linen, and the pure metal will be found in all its beauty

TO HARD SOLDER GOLD, SILVER, COPPER, BRASS, IRON, STEEL OR PLATINA.—The solders to be used for gold, silver, copper and brass are given in the preceding part. You commence operations by reducing your solder to small particles, and mixing it with powdered sal-ammoniac and powdered borax in equal parts, moistened to make it hold together. Having fitted up the joint to be soldered, you secure the article upon a piece of soft charcoal, lay your soldering mixture immediately over the joint, and then with your blow-pipe turn the flame of your lamp upon it until fusion takes place. The job is then done, and ready to be cooled and dressed up.

Iron is usually soldered with copper or brass in accordance with the above process. The best solder for steel is pure gold or pure silver, though gold or silver solders are often used successfully.

Platina can only be soldered well with gold; and the expense of it, therefore, contributes to the hindrance of a general use of platina vessels, even for chemical purposes, where they are of so much importance.

TO SOFT SOLDER ARTICLES.—Moisten the parts to be united with soldering fluid; then, having joined them together, lay a small piece of solder upon the joint and hold over your lamp, or direct the blaze upon it with your blow-pipe until fusion is apparent. Withdraw them from the blaze immediately, as too much heat will render the solder brittle and unsatisfactory. When the parts to be joined can be made to spring or press against each other, it is best to place a thin piece of solder between them before exposing to the lamp.

Where two smooth surfaces are to be soldered one upon the other, you may make an excellent job by moistening them with the fluid, and then, having placed a sheet of tin foil between them, holding them pressed firmly together over your lamp till the foil melts. If the surfaces fit nicely, a joint be may made in this way so close as to be almost imperceptible. The brightest looking lead which comes as a lining to tea boxes works better in the same way than tin foil.

TO CLEANSE GOLD TARNISHED IN SOLDERING.—The old English mode was to expose all parts of the article to a uniform heat, allow it to cool, and then boil until bright in urine and sal-ammoniac. It is now usually cleansed with diluted sulphuric acid. The pickle is made in about the proportion of one-eighth of an ounce acid to one ounce rain water.

TO CLEANSE SILVER TARNISHED IN SOLDERING.—Some expose to a uniform heat, as in the case of gold, and then boil in strong alum water. Others immerse for a considerable length of time in a liquid made of ½ oz. of cyanuret potassa to 1 pint rain water, and then brush off with prepared chalk.

BEAUTIFUL BRONZE FOR LEATHER.—Dissolve a little of the so-called insoluble analine violet in a little water, and brush the solution over the leather; after it dries, repeat the process.

NICKEL-PLATING.—The following is the substance of the patent granted to Dr. Isaac Adams, March 22, 1870. The process is highly successful. "This improvement consists in the use of 3 new solutions from which to deposit nickel by the electric current,

1. A solution formed of the double sulphate of nickel and alumina, or the sulphate of nickel dissolved in a solution of soda, potash, or ammonia alum, the three different varieties of commercial alum. 2. A solution formed of the double sulphate of nickel and potash. 3. A solution formed of the double sulphate of nickel and magnesia, with or without an excess of ammonia. I have found that a good coating of nickel can be deposited from the solutions before mentioned, provided they are prepared and used in such a manner as to be free from any acid or alkaline reaction. When these solutions are used, great care most be taken, lest by the use of too high battery power, or from the introduction of some foreign matters, the solution becomes acid or alkaline. I prefer to use these solutions at a temperature above 100° Fah., but do not limit my invention to the use of these solutions at that temperature. I therefore claim, 1. The electro deposition of nickel by means of a solution of the double sulphate of nickel and alumina, prepared and used in such a manner as to be free from the presence of ammonia, potash, soda, lime, or nitric acid, or from any acid or alkaline reaction. 2. The electro deposition of nickel by means of a solution of the double sulphate of nickel and potash, prepared and used in such a manner as to be free from the presence of ammonia, soda, alumina, lime or nitric acid, or from any acid or alkaline reaction. 3. The electro deposition of nickel by means of a solution of the double sulphate of nickel and magnesia, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime or nitric acid, or from any acid or alkaline reaction."

TO MAKE SILVER SOLUTION FOR ELECTRO-PLATING.—Put together into a glass vessel 1 oz. good silver, made thin and cut into strips; 2 oz. best nitric acid, and ½ oz. pure rain water. If solution does not begin at once, add a little more water—continue to add a very little at a time till it does. In the event it starts off well, but stops before the silver is fully dissolved, you may generally start it up again all right by adding a little more water.

When solution is entirely effected, add 1 quart of warm rain water and a large tablespoonful of table salt. Shake well and let settle, then proceed to pour off and wash through other waters as in the case of the gold preparation. When no longer acid to the taste, put in an ounce and an eighth cyanuret potassa and a quart pure rain water; after standing about 24 hours, it will be ready for use.

TO MAKE GOLD SOLUTION FOR ELECTRO-PLATING.—Dissolve five pennyweights gold coin, 5 grains pure copper, and 4 grains pure silver in 3 oz. nitro-muriatic acid; which is simply 2 parts muriatic acid and 1 part nitric acid. The silver will not be taken into solution as are the other 2 metals, but will gather at the bottom of the vessel. Add 1 oz. pulverized sulphate of iron, ½ oz. pulverized borax, 25 grains pure table salt, and 1 quart hot rain water. Upon this the gold and copper will be thrown to the bottom of the vessel with the silver. Let stand till fully settled, then pour off the liquid carefully, and refill with boiling rain water as before. Continue to repeat this operation until the precipitate is thoroughly washed; or, in other words, fill up, let settle, and pour off so long as the accumulation at the bottom of the vessel is acid to the taste.

You now have about an 18 carat chloride of gold. Add to it an ounce and an eighth cyanuret potassa, and 1 quart rain water—the latter heated to the boiling point. Shake up well, then let stand about 24 hours, and it will be ready for use.

Some use platina as an alloy instead of silver, under the impression that plating done with it is harder. I have used both, but never could see much difference.

Solution for a darker colored plate to imitate Guinea gold may be made by adding to the above 1 oz. of dragon's blood and 5 grs. iodide of iron.

If you desire an alloyed plate, proceed as first directed, without the silver or copper, and with an ounce and a half of sulphuret potassa in place of the iron, borax, and salt.

To Plate with a Battery.—If the plate is to be gold, use the gold solution for electro-plating; if silver, use the silver solution. Prepare the article to be plated by immersing it for several minutes in a strong lye made of potash and rain-water, polishing off thoroughly at the end of the time with a soft brush and prepared chalk. Care should be taken not to let the fingers come in contact with the article while polishing, as that has a tendency to prevent the plate from adhering; it should be held in two or three thicknesses of tissue paper.

Attach the article, when thoroughly cleansed, to the positive pole of your battery, then affix a piece of gold or silver, as the case may be, to the negative pole, and immerse both into the solution in such a way as not to hang in contact with each other.

After the article has been exposed to the action of the battery about ten minutes, take it out and wash or polish over with a thick mixture of water and prepared chalk or jeweller's rouge. If, in the operation, you find places where the plating seems inclined to peel off, or when it has not taken well, mix a little of the plating solution with prepared chalk or rouge, and rub the defective part thoroughly with it. This will be likely to set all right.

Govern your time of exposing the article to the battery by the desired thickness of the plate. During the time, it should be taken out and polished up as just directed about every ten minutes, or as often at least as there is an indication of a growing darkness on any part of its surface. When done, finish with the burnisher on prepared chalk and chamois skin, as best suits your taste and convenience.

In case the article to be plated is iron, steel, lead, pewter, or block tin, you must, after first cleaning with the lye and chalk, prepare it by applying with a soft brush—a camel's hair pencil is best suited—a solution made of the following articles in the proportion named:—Nitric acid, ½ oz.; muriatic acid, ⅓ oz.; sulphuric acid, 1-9th oz.; muriate of potash, 1-7th oz.; sulphate of iron, ⅛ oz.; sulphuric ether, 1-5th oz.; and as much sheet zinc as it will dissolve. This prepares a foundation, without which the plate would fail to take well, if at all.

To make Gold Amalgam.—Eight parts of gold and one of mercury are formed into an amalgam for plating, by rendering the gold into thin plates, making it red hot and then putting it into the mercury while the latter is also heated to ebullition. The gold immediately disappears in combination with the mercury, after which the mixture may be turned into water to cool. It is then ready for use.

TO PLATE WITH GOLD AMALGAM.—Gold amalgam is chiefly used as a plating for silver, copper or brass. The article to be plated is washed over with diluted nitric acid or potash lye and prepared chalk, to remove any tarnish or rust that might prevent the amalgam from adhering. After having been polished perfectly bright, the amalgam is applied as evenly as possible, usually with a fine scratch brush. It is then set upon a grate over a charcoal fire, or placed into an oven and heated to that degree at which mercury exhales. The gold, when the mercury has evaporated, presents a dull yellow color. Cover it with a coating of pulverized nitre and alum in equal parts, mixed to a paste with water, and heat again till *it* is thoroughly melted, then plunge into water. Burnish up with a steel or bloodstone burnisher.

TO MAKE AND APPLY GOLD-PLATING SOLUTION.—Dissolve ¼ oz. of gold amalgam in 1 oz. of nitro-muriatic acid. Add 2 oz. of alcohol, and then, having brightened the article in the usual way, apply the solution with a soft brush. Rinse and dry in sawdust, or with tissue paper, and polish up with chamois skin.

TO MAKE AND APPLY GOLD-PLATING POWDERS.—Prepare a chloride of gold the same as for plating with a battery. Add to it, when thoroughly washed out, cyanuret potassa in a proportion of 2 oz. to 5 pennyweights of gold. Pour in a pint of clean rain water, shake up well and then let stand till the chloride is dissolved. Add then 1 lb. of prepared Spanish whiting and let evaporate in the open air till dry, after which put away in a tight vessel for use. To apply it you prepare the article in the usual way, and having made the powder into a paste with water, rub it upon the surface with a piece of chamois skin or cotton flannel.

An old mode of making a gold-plating powder was to dip clean linen rags into solution prepared as in the second article preceding this, and having dried, to fire and burn them into ashes. The ashes formed the powder, and were to be applied as above.

TO MAKE AND APPLY SILVER-PLATING SOLUTION.—Put together in a glass vessel 1 oz. nitrate of silver, 2 oz. cyanuret potassa, 4 oz. prepared Spanish whiting, and 10 oz. pure rain water. Cleanse the article to be plated as per preceding directions, and apply with a soft brush. Finish with the chamois skin or burnisher.

TO MAKE AND APPLY SILVER-PLATING POWDER.—Dissolve silver in nitric acid by the aid of heat; put some pieces of copper into the solution to precipitate the silver; wash the acid out in the usual way; then, with 15 grains of it mix 2 drams of tartar, 2 drams of table salt, and ½ dram of pulverized alum. Brighten the article to be plated with lye and prepared chalk, and rub on the mixture. When it has assumed a white appearance, expose to heat as in the case of plating with gold amalgam, then polish up with the burnisher or soft leather.

TO ENAMEL GOLD OR SILVER.—Take ½ pennyweight of silver, 2½ pennyweights of copper, 3½ pennyweights of lead, and 2½ pennyweights of muriate of ammonia. Melt together, and pour into a crucible with twice as much pulverized sulphur; the crucible is then to be immediately covered that the sulphur may not take fire, and the mixture is to be calcined over a smelting fire until the superfluous sulphur is burned away. The compound is then to be coarsely pounded, and, with a solution of muriate of ammonia, to be formed into a paste which is to be placed upon the article it is designed to enamel. The article must then be held over a spirit lamp till the compound upon it melts and flows. After this it may be smoothed and polished up in safety. This makes the black enamel now so much used on jewellery.

To Destroy the Effects of Acid on Clothes.—Dampen as soon as possible, after exposure to the acid, with spirits ammonia. It will destroy the effect immediately.

To Wash Silverware.—Never use a particle of soap on your silverware, as it dulls the lustre, giving the article more the appearance of pewter than silver. When it wants cleaning, rub it with a piece of soft leather and prepared chalk, the latter made into a kind of paste with pure water, for the reason that water not pure might contain gritty particles.

To Cleanse Brushes.—The best method of cleansing watchmakers' and jewellers' brushes is to wash them out in strong soda water. When the backs are wood, you must favor that part as much as possible; for being glued, the water may injure them.

To Cut Glass Round or Oval without a Diamond.—Scratch the glass around the shape you desire with the corner of a file or graver; then, having bent a piece of wire in the same shape, heat it red hot and lay it upon the scratch, sink the glass into cold water just deep enough for the water to come almost on a level with its upper surface. It will rarely ever fail to break perfectly true.

To Re-Black Clock Hands.—Use asphaltum varnish. One coat will make old rusty hands look as good as new, and it dries in a few minutes.

To Gild Steel.—Pour some of the ethereal solution of gold into a wineglass, and dip into it the blade of a new penknife, razor, lancet, &c.; withdraw the instrument, and allow the ether to evaporate. The blade will then be found covered with a beautiful coat of gold. The blade may be moistened with a clean rag, or a small piece of very dry sponge dipped in the ether, and the same effects will be produced.

Silvering Shells.—Silver-leaf and gum water a sufficient quantity; grind to a proper thickness, and cover the inside of the shells. For a Gold Color, grind up gold-leaf with gum water, and apply to the inside of the shells.

Liquid Foil for Silvering Glass Globes, &c.—Lead, 1 part; tin, 1 part; bismuth, 1 part: melt, and, just before it sets, add mercury, 10 parts. Pour this into the globe, and turn it rapidly round.

Silver-Platers' Stripping Liquid.—Sulphuric acid, 8 parts; nitre, 1 part. Used to recover silver from old plated ware.

To Silver Clock-Faces, etc.—Old silver lace, ½ oz.; nitric acid, 1 oz. Boil them over a gentle fire for about 5 minutes in an earthen pot. After the silver is dissolved, take the mixture off, and mix it in a pint of clean water, then pour it into another vessel free from sediment; then add a tablespoonful of common salt, and the silver will be precipitated in the form of a white powder or curd; pour off the acid, and mix the curd with 2 oz. salt of tartar, and ½ oz. whiting, all together, and it is ready for use. To Use.—Clean your brass or copper plate with rotten stone and a piece of old hat; rub it with salt and water with your hand. Then take a little of the composition on your finger, and rub it over your plate, and it will firmly adhere and completely silver it. Wash it well with water. When dry, rub it with a clean rag, and varnish with this VARNISH FOR CLOCK-FACES. Spirits of wine, 1 pt.; divide into three parts, mix one part with gum-mastic in a bottle by itself; 1 part spirits and ½ oz. sandarach in another bottle; and 1 part spirits and ½ oz. of whitest gum benjamin, in another bottle; mix and temper to your mind. If too thin, some mastic; if too soft, some sandarach or benjamin. When you use it, warm the silvered plate before the fire, and, with a flat camel's-hair pencil, stroke it over till no white streaks appear, and this will preserve the silvering for many years.

REFINING GOLD AND SILVER.—The art of assaying gold and silver is founded upon the feeble affinity which these have for oxygen in comparison with copper, tin, and other cheap metals, and on the tendency which the latter metals have to oxidize rapidly in contact with lead at a high temperature, and sink with it into any porous, earthy vessel in a thin, glassy, vitrified mass. The precious metal having previously been accurately weighed and prepared, the first process is CUPELLATION. The *muffle*, with cupel properly arranged on the "*muffle plate*," is placed in the furnace, and the charcoal added, and lighted at the top by means of a few ignited pieces thrown on last. After the cupels have been exposed to a strong white heat for about half an hour, and have become white hot, the lead is put into them by means of tongs. As soon as this becomes bright red and "*circulating*," as it is called, the specimen for assay, wrapped in a small piece of paper or lead-foil, is added; the fire is now kept up strongly until the metal enters the lead and "*circulates*" well, when the heat, slightly diminished, is so regulated that the assay appears convex and more glowing than the cupel itself, whilst the "*undulations*" circulate in all directions, and the middle of the metal appears smooth, with a margin of litharge, which is freely absorbed by the cupel. When the metal becomes bright and shining, or, in technical language, begins to "*lighten*," and prismatic hues suddenly flash across the globules, and undulate and cross each other, followed by the metal becoming very brilliant and clear, and at length bright and solid (called the *brightening*), the separation is ended, and the process complete. The cupels are then drawn to the mouth of the "muffle," and allowed to cool slowly. When quite cold, the resulting "*button*," if of SILVER, is removed by the "pliers" or "tongs" from the cupels, and, after being flattened on a small *anvil of polished steel*, with a polished steel hammer, to detach adhering oxide of lead, and cleaned with a small, hard brush, is very *accurately weighed*. The weight is that of *pure silver*, and the difference between the weight before cupellation and that of the pure metal represents the proportion of alloy in the sample examined. In the case of GOLD, the metal s next to undergo the operations of QUARTATION. The cupelled mple is fused with 3 times its weight of pure silver, (called the *niness*"), by which the gold is reduced to one-fourth of the mass, s, and in this state may easily be removed by PARTING. The oy, after quartation, is hammered or rolled out into a thin strip leaf, curled into a spiral form, and boiled for a quarter of an ur with about 2½ to 3 oz. of nitric acid (specific gravity, 1.3); d the fluid being poured off, it is again boiled in a similar man- r, with 1½ to 2 oz. more nitric acid (sp. gr., 1.2); after which the ld is carefully collected, washed in pure water, and dried. hen the operation of parting is skilfully conducted, the acid not strong, the metal preserves its spiral form; otherwise it falls o flakes or powder. The second boiling is termed the "*reprise*." e loss of weight by parting corresponds to the quantity of SILVER ginally in the specimen.

FOR ALLOYS CONTAINING PLATINUM, which usually consist of pper, silver, platinum, and gold, the method of assaying is as lows: The alloy is cupelled in the usual way, the loss of weight presses the amount of *copper*, and the "button," made into a and and treated with sulphuric acid, indicates by the portion solved that also of the *silver* present. By submitting the resi- um to quartation, the *platinum* becomes soluble in nitric acid. e loss after digestion in this menstruum expresses the weight that metal, and the weight of the portion now remaining is that pure gold. Gold containing PALLADIUM may be assayed in the me manner. ANNEALING.—This consists in putting the pure gold o a small, porous crucible, or cupel, and heating it to redness the muffle. WEIGHING must be done with the utmost accu- cy. The weight in grains Troy, doubled or quadrupled, as e case may be, gives the number of *carats fine* of the alloy amined, without calculation.

According to the OLD FRENCH METHOD of assaying gold, the fol- wing quantities were taken: For the *assay pound*, 12 gr.; fine ver, : 0 gr.; lead, 108 gr. These having been cupelled together, e perfect button is rolled into a leaf (1½ × 5 inches), twisted on quill, and submitted to parting with 2½ oz. and 1½ oz. of nitric id, sp. gr., 1.16 (20° Baume.) The remainder of the process is nilar to that above described.

The usual weight of silver taken for the *assay pound*, when the eneness is reckoned in 1000ths, is 20 gr., every real grain of iich represents 50-1000ths of fineness, and so on of smaller divi- ons.

ENAMELLING ON GOLD OR COPPER.—The basis of all enamels is a ghly transparent and fusible glass, called FRIT, FLUX, or PASTE, iich readily receives a color on the addition of the metallic ides. *Preparation.*—Red lead, 16 parts; calcined borax, 3 parts; unded flint glass, 12 parts; flints, 4 parts. Fuse in a Hessian ucible for 12 hours, then pour it out into water, and reduce it powder in a biscuit-ware mortar. The following directions will rve to show how the coloring preparations are made: *Black* amels are made with peroxyde of manganese, or protoxyde of n, to which more depth of color is given with a little cobalt. *olet* enamel of a very fine hue is made from peroxyde of manganese in small quantity, with saline or alkaline fluxes. enamel is made from protoxyde of copper. Boil a solution of equ parts of sugar and acetate of copper in four parts of water. sugar takes possession of a portion of the cupreous oxide, a reduces it to the protoxyde ; when it may be precipitated in form of a granular powder of a brilliant red. After about t hours of moderate boiling, the liquid is set aside to settle, decan off the precipitate, which is washed and dried. By this pure ox any tint may be obtained from red to orange by adding a grea or smaller quantity of peroxyde of iron. The oxide and purpl Cassius are likewise employed to color red enamel. This com sition resists a strong fire very well. *Green* enamel can be produ by a mixture of yellow and blue, but is generally obtained dir from the oxide of copper, or, better still, with the oxide of chro which last will resist a strong heat. *Yellow.*—Take one part white oxide of antimony, with from one to three parts of wh lead, one of alum, and one of sal-ammoniac. Each of these s stances is to be pulverized, then all are to be exactly mixed, exposed to a heat adequate to decompose the sal-ammoniac. operation is judged to be finished when the yellow color is brought out. *Blue.*—This color is obtained from the oxide cobalt, or some of its combinations, and it produces it with su intensity that only a very little can be used lest the shade sho pass into black. A *white* enamel may be prepared with a *cal* formed of 2 parts of tin and 1 of lead, calcined together : of combined oxide, 1 part is melted with 2 parts of fine crystal a very little manganese, all previously ground together. Wh the fusion is complete, the vitreous matter is to be poured i clear water, and the frit is then dried and melted anew. Rep the pouring into water three or four times, to insure a perf combination Screen the crucible from smoke and flame. smallest portions of oxide of iron or copper admitted into enamel will destroy its value.

The artist prepares his enamel colors by pounding them in agate mortar, with an agate pestle, and grinding them on an ag slab, with oil of lavender rendered viscid by exposure to the s in a shallow vessel, loosely covered with gauze or glass. should have alongside of him a stove, in which a moderate fir kept up, for drying his work whenever the figures are finished. is then passed through the muffle.

SILVER-PLATING.—File the parts which are to receive the pl very smooth ; then apply over the surface the muriate of zi which is made by dissolving zinc in muriatic acid ; now hold part over a dish containing hot soft solder, and with a swab ap the solder to the part to which it will adhere, brush off all su fluous solder, so as to leave the surface smooth ; you will take No. 2 fair silver plate, of the right size to cover the prepa surface, and lay the plate upon it, and rub down smooth wit cloth moistened with oil ; then, with a tinned soldering iron, slowly over all the surface of the plate, which melts the sol underneath it, causing the plate to adhere as firmly as the so does to the iron ; then polish the surface, and finish with bu skin.

ELKINGTON'S PATENT GILDING.—Fine gold, 5 oz. (troy); nitro-muriatic acid, 52 oz. (avoirdupois); dissolve by heat, and continue the heat until red or yellow vapors cease to be evolved; decant the clear liquor into a suitable vessel; add *distilled* water, 4 gals.; pure bi-carbonate of potassa, 20 lbs.; and boil for 2 hours. N.B.—The nitro-muriatic acid is made with *pure* nitric acid (sp. gr., 1.45) 21 oz.; *pure* muriatic acid (sp. gr., 1.15), 17 oz.; and *distilled* water, 14 oz.

The articles, after being perfectly cleaned from scale or grease, and receiving a proper *face*, are to be suspended on wires, dipped into the liquid *boiling hot*, and moved about therein, when, in from a few seconds to a minute, depending on the newness and strength of the liquid, the requisite coating of gold will be deposited on them. By a little practice the time to withdraw the articles is readily known; the duration of the immersion required to produce any given effect gradually increases as the liquid weakens by use. When properly gilded, the articles are withdrawn from the solution of gold, washed in clean water and dried; after which they undergo the usual operation of coloring, &c.

A "*dead gold*" *appearance* is produced by the application to the articles of a *weak* solution of *nitrate of mercury* previously to the immersion in the gilding liquor, or the *deadening* may be given by applying a solution of the nitrate to the *newly gilded* surface, and then expelling the mercury by heat.

SPOT GILDING, or gilding in spots, producing a very fine appearance, is done by putting a thin coat of oil on those parts of the metal where you do not wish the gilding to appear, the gold will then be deposited on those spots only where there is no oil, and the oil is easily removed when the job is finished.

WATCHMAKERS' OIL.—Insert coils of thin sheet lead into olive oil in a bottle, expose it to the sun for a few weeks, and pour off the clear.

SOLUTION FOR DIPPING STEEL ARTICLES, PREVIOUS TO ELECTRO-PLATING.—Nitrate of silver, 1 part; nitrate of mercury, 1 part; nitric acid (sp. gr., 1.384), 4 parts; water, 120 parts. *For copper articles.*—Sulphuric acid, 64 parts; water, 64 parts; nitric acid, 32 parts; muriatic acid, 1 part; mix. The article, free from grease, is dipped in the pickle for a second or two.

POLISHING DIAMONDS.—The plan in use at all the large diamond cutters is simply a cast iron disc of good metal, with a vertical spindle run through its centre, balanced, and turned, and faced true in a lathe. The disc revolves at about 1000 revolutions per minute. With a little diamond dust and oil the stone is set in a small brass cup filled with common soft solder; it is then screwed up in the clamps and applied to the skive till the facet is formed.

RECEIPTS FOR MACHINISTS, ENGINEERS, MILLOWNERS, BLACKSMITHS, LOCOMOTIVE BUILDERS, &c., &c., AND METAL WORKERS OF EVERY KIND.

ON SAWMILLS.—HOW TO GET THE MOST LUMBER FROM SAWLOGS.—Experience has abundantly proved to our satisfaction that this can

be done only by the use of the circular saw. Human ingen
thanks be to the Giver of all Good,has been so prolific in the i
tion and construction of this kind of machinery, that the prin
difficulty with the intending purchaser seems to be an inabili
decide whose machine is really the best. Every builder or inv
of a rotary sawmill appears to claim for his machine such a
fect constellation of most desirable features, that a certain an
of hesitation in coming to a decision seems to be inevi
Having tried the up and down saw and the circular saw als
would again repeat our conviction that the last mentioned
best for manufacturing lumber, and should any person a
this expression of opinion, let him in the first place be very c
to get if possible the best machine, bring it to the mill, and
perfectly level and true. When you get it in operation,see tha
handle it carefully. If you have been used to running the u
down saw only, you will soon find out that your former expe
avails almost nothing in the management of the rotary mac
but when you get the hang of running it, the compensation i
way of convenience, rapidity, and quantity of work, is imn
Some prefer to use the inserted tooth saws, and will use no c
They seem to possess many advantages, and are entirely saf
late invention of *spreading* the *upper part* of the tooth *towar*
point during the process of manufacture, spreading it out so
make the point of the tooth the *thickest* part of the circumferen
the saw, enables the sawyer to dispense in a great measure
the use of the swage. Those inserted tooth saws which d
possess this improvement must be carefully swaged and fil
least twice per day, and sometimes as often as six or seven
per day, depending upon the kind of lumber being cut. In fili
swaging the saw, be careful to form the point of the teeth
lutely square, and even across, the slightest deviation from p
truth in this respect being apt to cause the saw to *run*, as
termed, or vary from its proper course while passing throug
log. Some prefer to form the point of the tooth a little hoo
just enough so as to be barely perceptible, and in swaging t
that part of the die belonging to the swage, which gives the
of the saw a slightly curved or rainbow form, something in this
⌒, or scarcely so much curved. One sawyer of 20 years' exper
in running machinery, informed us that he never did better or
rapid work with his mill than when he kept his saw exactly
on these *two points* just stated. If you can run a No. 7 g
saw on your mill, the loss resulting from sawdust will be
slight, and as large saws are generally thickest at the c
tapering off towards the circumference, this size or No. 6 will
general rule, be found sufficiently strong for most purposes.
sure at all times, especially during frosty weather, that the
have a secure hold of the log before the saw enters it. It is o
few days ago that a case came to my knowledge of a firm
Fredericton, N.B., having sustained a severe loss by a log (ins
ently secured, of course) canting over on the saw as it was pa
through it. The effect was to break off the saw from the ma
twist off the nut at the end near the saw, and break away th
iron pins used for securing the saw in the collar, causing a

page of the mill, and the consequent expense of repair and delay. When you get the mill in operation, see that you handle it carefully, and maintain unceasing watchfulness over her while in operation. Give her *plenty of power*; if you *don't*, you may as well shut up shop at once; *good attendance*, and with a good machine, the attendants will not have much time to play themselves, I can assure you. Keep all the parts well *oiled*—that has a great deal to do with the smooth and successful running of the machine; and, by the way, I would remark that sawmills are not the only things in this world that run all the better for being oiled. If that kind, loving, gentle, and affectionate spirit of which *oil* is the symbol, pervaded the hearts and minds of our race, and found universal expression in every thought, word, and deed during our daily intercourse with each other, it would be a very different world from what it is—better for ourselves, and better for our neighbors. Let us all carry on *this* branch of the *oil business* as extensively as possible, and we shall soon see a brotherhood "dwelling together in unity." In order to facilitate calculations regarding the velocity of saws, herewith is appended a reliable table to serve as a guide in ascertaining the proper speed for running :—

Table of Speed for Circular Saws.

36	inches in	diameter,	1000	revolutions	per minute.
38	"	"	950	"	"
40	"	"	900	"	"
42	"	"	870	"	"
44	"	"	840	"	"
46	"	"	800	"	"
48	"	"	760	"	"
50	"	"	725	"	"
52	"	"	700	"	"
54	"	"	675	"	"
56	"	"	650	"	"
58	"	"	625	"	"
60	"	"	600	"	"
62	"	"	575	"	"
64	"	"	560	"	"
66	"	"	545	"	"
68	"	"	530	"	"
70	"	"	515	"	"
72	"	"	500	"	"
74	"	"	485	"	"
76	"	"	475	"	"

Who Make the Best Saw-mills and Saws.—The parties engaged in this business who may be called first class men in their line are so numerous, that it is hard to tell where to begin or where to leave off in making honorable mention. C. H. Waterous & Co., of Brantford, Ont., have the reputation of turning out first class circular saw mills, and portable engines to drive them. They have sent many of their mills down to New Brunswick, where the gang-saw has been doing most of the business hitherto, and they appear to be giving satisfaction. The Joseph Hall Mf'g. Co., Oshawa, Ont., Mr. Glen, president, also rank very high. The same may be said of W. P. Bartley & Co., of Montreal; James Harris, of the New Brunswick Foundry, St. John, N.B. Messrs. McFarlane & Anderson, of St. Mary's and Fredericton, N.B., with their two establishments—the one at the latter place being quite extensive, and lately rebuilt at great cost since the fire which destroyed it in the summer of 1871—are now fully prepared to execute any orders for saw-mills, steam engines, &c., at reasonable rates. For the benefit of those residing in the United States, we may mention that Stearns, Clark, & Co., of Erie, Pa., turn out the very best of work. Having made a personal examination of their facilities and appliances, we say that they rank second to none, and, in proof of this, would state that we saw a letter in the "Scientific American" a few days ago, from a party who was running one of their mills in Wisconsin, if we mistake not, making the statement that he had cut upwards of 60,000 feet in one day with one of their circular saw-mills. That was big business, but the work was done, and the figures produced to prove it from a disinterested source. There are also one or two firms in Bangor, Me., who turn out good machinery for saw-mills; but it is almost invidious to mention isolated firms where there is such an aggregation of excellent houses in this business all over the United States and Canada. In the line of saw manufacturers we would enumerate Morland & Watson, and James Robertson, of Montreal, Alex. Richardson & Co., of St. John, N.B., and J. F. Lawton, also of St. John, as bearing the reputation of turning out good work. In the United States we have honorable and able firms bearing the names of Welch & Griffiths of Boston, the Providence Saw Co., Providence, R.I., who make inserted tooth saws only; R. Hoe & Co., of New York: the American Saw Co., New York; Disston of Philadelphia; Porter Saw Co., Bristol, Conn.; Hubbard of Pittsburg, Pa.; Atkins of Indianapolis, Ind.; Messrs. Sinker & Co., of the same place; Mellus of Detroit, Mich.; Branch, Crookes, & Co., of St. Louis, Mo., and one or two good firms in Cleveland, Ohio.

SHINGLE MACHINES.—There are numerous good machines of this class, very highly recommended by the different manufacturers as a matter of course, but the *interested* representations as to their capability of performing such incredible prodigies of work in a day, are most generally to be taken at a "liberal discount," as the dry goods merchant most eloquently expresseth it. Having had rather unusual opportunities of witnessing the performance of various kinds of shingle machines, I will specify a few, premising, in the first place, that I am neither interested in the sale of shingle or any other machines, nor in the receipt of "a valuable consideration" from the manufacturers for recommending them. James Harris of St John, N.B., has built a large number of the Close shingle machines (vertical saw) during the year 1871. I hear them highly spoken of, and have seen one, but not in operation. I should judge it was a very good machine, price $175, with a Bangor edger or trimmer, $25 extra. The Muzzey Iron Works Company, Bangor, Me., build a very good shingle machine (vertical saw); I have seen many in operation; they will turn out a good deal of work, and do it well. Trevor and Co., of Lockport, N.Y., turn out very good shingle and heading machines (vertical saw) As a proof of their popularity, I may state that Mr. T. Thompson, of Black Rock, N.Y., has four or five of these shingle machines in operation, and prefers them to all others. I can also bear witness that M. Badger and Co., of Rochester, N.Y., build excellent shingle and heading machines (horizontal saw), and are really deserving of approbation and patronage, not only on account of turning out good machinery, but from the circumstance that the proprietors are two young ladies (who have inherited the business of their father, now many years deceased) who attend personally to the management of the financial part of the business, while the superintendent, Mr. Doughty, is possessed of every qualification to ensure good work in the mechanical department. I would also mention James E. Austin and Co., of Oswego, N.Y., as a firm who have expended a great deal of money and much ingenuity in the invention and manufacture of shingle machines, and have brought them to a point of perfection which leaves little more to be desired. Although the machine is quite complicated, it can be speeded up to cut very rapidly. One gentleman in Oswego informed me that he had cut as high as 33,000 shingles per day. I should say that that was an extra day's work, but it must be borne in mind that the machine carries two blocks at one time, cutting a shingle from each block alternately. This machine also requires a smart careful operator; any negligence on his part will undoubtedly be rewarded with a shower of dangerous projectiles, flying "fast and furious," not at all careful who or where they strike. The price of this machine is $600. I have seen only one shingle machine that could compete with Austin's. This was in Chicago previous to the great fire, and it could cut about 8000 shingles per hour. I was informed that it was made in Wisconsin, and cost $1400. Many other good machines are made by other makers besides those mentioned above, but space will not admit of further mention. Any enquiries addressed to either of the aforesaid manufacturers will be answered by illustrated circulars containing full information. In the manufacture of shingles, as well as in anything else, it is the wisest policy to use the best materials. Get good rift, free from knots, sand, bark, &c., and you will inevitably get good merchantable stuff, with less waste and more pleasure every way, both with the machinery in the first place, and the satisfactory state of your exchequer in the last. It is all the better if you can lay in a good stock one year ahead, as it cuts much easier when properly seasoned, to say nothing of the saving in weight during transportation. In edging shingles, many prefer the saw to the revolving knives, as it enables the operator in many cases to get a shingle of extra quality by trimming a poor shingle down, and selecting the best part. This can be done by a smart hand with marvellous rapidity, but still, to use a modern phrase, many persons can't see it, and so they use the knives, giving what they conceive to be good reasons for so doing.

VELOCITY OF WHEELS, PULLEYS, DRUMS, &c.—When wheels are applied to communicate motion from one part of a machine to another, their teeth act alternately on each other; consequently, if one wheel contains 60 teeth, and another 20 teeth, the one containing 24 teeth will make 3 revolutions while the other makes but 1; and if drums or pulleys are taken in place of wheels, the effect will be the same; because their circumferences, describing equal spaces, render their revolutions unequal; from this the rule is derived, namely:—

Multiply the velocity of the driver by the number of teeth it contains, and divide by the velocity of the driven. The quotient will be the number of teeth it ought to contain; or, multiply the velocity of the driver by its diameter, and divide by the velocity of the driven.

Example 4. If a wheel that contains 75 teeth makes 16 revolutions per minute, required the number of teeth in another, to work into and make 24 revolutions in the same time. According to rule, you multiply 16 by 75, and divide the product, which is 1200, by 24, and you have the answer, 50 teeth.

Example 5. Suppose a drum, 30 inches in diameter, to make 20 revolutions in a minute, required the diameter of another to make 60 revolutions per minute. According to rule, you multiply 20 by 30, and divide the product, which is 600, by 60, and you have the answer, 10 inches.

Example 6. A wheel 64 inches in diameter, and making 42 revolutions per minute, is to give motion to a shaft at the rate of 77 revolutions in the same time; find the diameter of a wheel suitable for that purpose. According to rule, multiply 42 by 64, and divide the product, which is 2688, by 77, and you will have for the answer 35 inches nearly.

77)2688(34$\frac{70}{77}$
231
——
378
308 70
——

Example 7. Suppose a pulley 32 inches diameter to make 26 revolutions; find the diameter of another to make 12 revolutions in the same time.

According to rule, 26 × 32 ÷ 12 = 69$\frac{1}{3}$ —
26 and 12) 832. This will be seen to be 69$\frac{1}{3}$
32 ——
— 69$\frac{4}{12}$ = $\frac{1}{3}$
832

Example 8. Find the number of revolutions per minute made by a wheel or pulley 20 inches in diameter, when driven by another 48 inches in diameter, and making 45 revolutions in the same time. According to rule, 48 × 45 ÷ 20 = 108. That is, 48 multiplied by 45 = 2160, divided by 20, gives the answer, 108 revolutions.

A leather belt should have a velocity of about 1300 feet per minute, and not more than 1800 feet, or it will not last long. If the lightning pulley is used too strong, it increases friction in the gudgeons of the shaft, and prematurely destroys the belt.

TO INCREASE THE POWER AND DURABILITY OF RUBBER BELTING.—*Apply* the following composition with a painter's brush, and let it *dry*:—Red lead, black lead, French yellow, and litharge, equal parts; mix with boiled linseed oil and japan sufficient to make it dry quick. This will produce a highly-polished surface. Should the belt slip, moisten lightly on the side next the pulley with linseed oil, and repeat the application if necessary.

Belting Friction.—The friction by belting on pulleys is 47 for greased leather, when run on wood drums or pulleys; 50 for dry leather on wood; 38 for oiled leather on cast-iron pulleys; and 28 for dry leather on cast-iron pulleys.

Belgian Welding Powder.—Iron filings, 1000 parts; borax, 500 parts; balsam of copaiba, or other resinous oil, 50 parts; sal-ammoniac, 75 parts. Mix all well together, heat, and pulverize completely. The surfaces to be welded are powdered with the composition, and then brought to a cherry red heat, at which the powder melts, when the portions to be united are taken from the fire and joined. If the pieces to be welded are too large to be both introduced into the forge, one can be first heated with the welding powder to a cherry red heat, and the other afterwards to a white heat, after which the welding may be effected.

Composition Used in Welding Cast Steel.—Borax, 10 parts; sal-ammoniac, 1 part; grind or pound them roughly together; then fuse them in a metal pot over a clear fire, taking care to continue the heat until all spume has disappeared from the surface. When the liquid appears clear, the composition is ready to be poured out to cool and concrete; afterwards being ground to a fine powder, it is ready for use. To use this composition, the steel to be welded is raised to a heat which may be expressed by "bright yellow;" it is then dipped among the welding powder, and again placed in the fire until it attains the same degree of heat as before: it is then ready to be placed under the hammer.

Tempering Steel Springs.—The steel used should be that called "spring" for large work; for small work, "double shear." After hardening in the usual way, in water, or, as some prefer, in oil, dry the spring over the fire to get rid of its moisture, then smear it over with tallow or oil, hold it over the flame of the smith's forge, passing it to and fro, so that the whole of it will be equally heated, holding it there until the oil or tallow takes fire. Take the article out of the fire and let it burn a short time, then blow it out. This process may be repeated two or three times if the operator fancies that any portion of the spring has not been reduced to the proper temperature, or rather, raised to it.

Tempering Saws.—A late improvement consists in tempering and straightening the saws at one operation. This is done by heating the saws to the proper degree, and then pressing them with a sudden and powerful stroke between two surfaces of cold iron. A drop press is employed for the purpose. The mechanism is quite simple and inexpensive. Its use effects an important economy in the manufacture of nearly all kinds of saws, and also improves their quality

Tempering Liquid.—Water, 3 gals.; soda, 2 oz.; saltpetre, 2 oz.; prussic acid, 1 oz., or oil of vitriol, 2 oz.

Tempering Spiral Springs.—Place a piece of round iron inside the spring, large enough to fill it; then make the spring and iron red hot, and, when hot place them quickly into cold water, and stir them about till cold; afterwards rub them with oil or grease, and move them about in a flame till the grease takes fire; the spring will then be reduced to its proper temper.

To Soften Malleable Iron.—When your furnace is charged with fuel and metal, get the fire up to a dull red heat, then pour fluoric acid all over the coke; use ½ pt. to 1 pt. or even 1 qt., adding a handful of fluor spar; it will make the metal much softer.

Chilled Iron.—At Lister's Works, Darlington, England, some articles required turning in the lathe, and cast steel could not be made hard enough to cut them. One man proposed cast metal tools. He was laughed at, of course, but his plan had to be tried. Well, cast metal tools were tried, with points chilled, and they cut when cast steel tools were of no use. The article was turned up with metal tools.

Drilling Holes in Cast Iron.—By means of carbolic acid a hole ¼ of an inch in diameter has been drilled through ½ inch thickness of cast iron, with a common carpenter's brace; judge, then, what can be done by using the acid and pressure drill.

To restore Burnt Steel and improve Poor Steel.–Borax, 3 oz.; sal-ammoniac, 8 oz.; prussiate of potash, 3 oz.; blue clay, 2 oz.; resin, ¼ lb.; water, 1 gill; alcohol, 1 gill. Put all on the fire, and simmer till it dries to a powder. The steel is to be heated, dipped into this powder, and afterwards hammered.

Composition to Toughen Steel.—Resin, 2 lbs.; tallow, 2 lbs.; black pitch, 1 lb.; melt together, and dip in the steel when hot.

Burglar and Drill-Proof Diamond Chill.—Take 1 gal. urine, and add to it 1 oz. borax and 1 oz. salt.

To re-cut Old Files.—Remove the grease and dirt from your files by washing them in warm potash water, then wash them in warm water, and dry with artificial heat; next, place 1 pt. warm water in a wooden vessel, and put in your files, add 2 oz. of blue vitriol, finely pulverized, 2 oz. of borax, well mixed, taking care to turn the files over, so that each one may come in contact with the mixture. Now add 7 oz. sulphuric acid and ¼ oz. cider vinegar to the above mixture. Remove the files after a short time, dry, sponge them with olive oil, wrap them up in porous paper, and put aside for use. Coarse files require to be immersed longer than fine.

Substitute for Borax.—Copperas, 2 oz.; saltpetre, 1 oz.; common salt, 6 oz.; black oxide of manganese, 1 oz.; prussiate of potash, 1 oz.; all pulverized and mixed with 3 lbs. of nice welding sand, and use the same as you would sand. High-tempered steel can be welded with this at a lower heat than is required for borax.

Tempering Liquid for Mill picks.—Rain water, 3 gals.; spirits of nitre, 3 oz.; hartshorn, 3 oz.; white vitriol, 3 oz.; alum, 3 oz.; sal-ammoniac, 3 oz.; salt, 6 oz.; with 2 handfuls of the parings of horse's hoofs. The steel to be heated to a cherry red. A large jug of this preparation should be kept corked tight, to keep its strength from being lost by evaporation.

To Soften Iron or Steel.—Either of the following methods will make iron or steel very soft:—1. Anoint it all over with tallow, temper it in a gentle charcoal fire, and let it cool of itself. 2. Take a little clay, cover your iron with it, temper in a charcoal fire. 3. When the iron or steel is red hot, strew hellebore on it

4. Quench the iron or steel in the juice or water of common beans.

To **file a square hole.**—To file a hole square, it is necessary to reverse the work very often; a square file should first be used, and the holes finished with either a diamond-shaped file, or a half round. This leaves the corners square, as they properly should be.

To **Temper Small Springs.**—*In large quantities.*—First, harden them in the usual manner of hardening steel; then place as many as convenient in a vessel containing oil. Heat the oil containing the springs until it takes fire from the top, then set off the vessel and let it cool. The springs will then be found to possess the required temper.

Tempering.—The article, after being completed, is hardened by being heated gradually to a bright red, and then plunged into cold water: it is then tempered by being warmed gradually and equably, either over a fire, or on a piece of heated metal, till of the color corresponding to the purpose for which it is required, as per table below, when it is again plunged into water.

	Corresponding temperature.		
A very pale straw	430	Lancets Razors	
Straw	450		
Darker straw	470	Penknives Scissors	All kinds of wood tools, Screw taps.
Yellow	490		
Brown yellow	500	Hatchets, Chipping Chisels, Saws. All kinds of percussive tools.	
Slightly tinged purple	520		
Purple	530		
Dark purple	550	Springs.	
Blue	570		
Dark blue	600	Soft for saws.	

Crucibles.—The best crucibles are made from pure fire-clay, mixed with finely-ground *cement* of old crucibles, and a portion of black-lead or graphite; some pounded coke may be mixed with the plumbago. The clay should be prepared in a similar way as for making pottery-ware; the vessels, after being formed, must be slowly dried, and then properly baked in the kiln.

Black-lead crucibles are made of 2 parts graphite, and 1 of fire-clay, mixed with water into a paste, pressed in moulds, and well dried, but not baked hard in the kiln. This compound forms excellent small or portable furnaces.

Tempering Razors, Cutlery, Saws, &c.—Razors and penknives are too frequently hardened without the removal of the scale arising from the forging: *this practice, which is never done with the best works, cannot be too much deprecated.* The blades are heated in a coke or charcoal fire, and dipped in the water obliquely In tempering razors, they are laid on their backs upon a clean fire, about half-a-dozen together, and they are removed one at a time, when the edges, which are as yet thick, come down to a pale-straw color. Should the backs accidentally get heated beyond the straw-color, the blades are cooled in water but not otherwise. Pen-blades are tempered a dozen or two at a time, on a plate of iron or copper, about 12 inches long, 3 or 4 inches wide, and about ¼ of an inch thick. The blades are arranged close together on their backs and lean at an angle against each other. As they come down to the temper, they are picked out with small pliers and thrown into water if necessary; other blades are then thrust forward from the cooler parts of the plate to take their place. Axes, adzes, cold chisels, and other edge tools, in which the total bulk is considerable compared with the part to be hardened, are only partially dipped: they are afterwards let down by the heat of the remainder of the tool; and, when the color indicative of the temper is attained, they are entirely quenched. With the view of removing the loose scales, or the oxydation acquired in the fire, some workmen rub the objects hastily in dry salt before plunging them in the water, in order to give them a cleaner and brighter face.

Oil, or resinous mixtures of oil, tallow, wax, and resin, are used for many thin and elastic articles, such as needles, fish-hooks, steel pens and springs, which require a milder degree of hardness than is given by water. Gun lock-springs are sometimes *fried in oil* for a considerable time over a fire, in an iron tray; the thick parts are then sure to be sufficiently reduced, and the thin parts do not become the more softened from the continuance of the blazing heat.

Saws and springs are generally hardened in various compositions of oil, suet, wax, &c. The saws are heated in long furnaces, and then immersed horizontally and edgeways into a long trough containing the composition. Part of the composition is wiped off the saws with a piece of leather, when they are removed from the trough, and heated one by one, until the grease inflames. This is called "*blazing off.*" The composition used by a large saw manufacturer is 2 lbs. suet, and ¼ lb. of bees'-wax, to every gallon of whale oil; these are boiled together, and will serve for thin works and most kinds of steel. The addition of black resin, about 1 lb. to each gallon, makes it serve for thicker pieces, and for those it refused to harden before; but resin should be added with judgment, or the works will become too hard and brittle.

To Reduce Oxide of Zinc.—The oxide may be put in quantities of 500 or 600 lbs. weight into a large pot over the fire; pour a sufficient quantity of muriatic acid over the top, to act as a flux, and the action of the fire will melt the dross, when the pure metal will be found at the bottom of the pot.

To Temper Taps or Reamers without springing, select your steel for the job, and forge the tap with a little more than the usual allowance, being careful not to heat too hot nor hammer too cold; after the tap or reamer is forged, heat it and hold it on one end on the anvil. If a large one, hit it with the sledge; if a small one, the hammer will do. This will cause the tap to bend slightly. Do not straighten it with the hammer, but on finishing and hardening the tap, it will become straight of its own accord.

To Harden and Temper Cast Steel.—For saws and springs in general the following is an excellent liquid: Spermaceti oil, 20 gals.; beef suet *rendered*, 20 lbs.; neat's-foot oil, 1 gal.; pitch, 1 lb.; black resin, 3 lbs. The last two articles must be previously melted together, and then added to the other ingredients, when the whole must be heated in a proper iron vessel, with a close cover fitted to it, until all moisture is evaporated, and the compowill take fire on a flaming body being presented to its sur-

CANITE EMERY WHEELS.—Use a compound of India rubber,
Vellington mills emery, as little of the former as will suffice
d the particles of emery together. The materials must be
ughly incorporated together, then rolled into sheets, cut into
s of the desired size and pattern, pressed into iron moulds,
ulcanized or cured by being subjected to a high degree of
heat for several hours, making it almost as hard as cast iron.

BRAZE A BAND SAW.—*Whitney's method.*—The tools required
small portable forge, brazing clamps, &c, and a straight edge,
feet long, also some brass wire and powdered borax. Take
w and cut it to the proper length, scarf the ends from one
to three-fourths of an inch, then put the saw in the clamps.
ld say that I use a very small and simple clamp in the shape
double vise. Keep the back of the saw out of the jaws of
ise, or clamps, and apply the straight edge to the back, as it
ry necessary to braze it straight; make the fire in as small a
ase as possible; place the clamps directly over the centre of
re, and then put on three pieces of brass wire, bent in the
of the letter U, so that they will pinch the laps together; put
much borax as will lie on the saw, cover the whole with a
of charcoal; melt the brass so that it will flow over the saw
taking it off the fire, and cool very slow so as not to make
raze brittle. File off what remains on the saw, and it is ready
e.

REMOVE RUST.—If you immerse the articles in kerosene oil and
em remain for some time, the rust will become so much loos-
as to come off very easy.

SOLDER FERRULES FOR TOOL HANDLES.—Take your ferrule, lap
l the jointing a small piece of brass wire, then just wet the
le, scatter on the joining ground borax, put it on the end of a
and hold it in the fire till the brass fuses. It will fill up the
g, and form a perfect solder. It may afterwards be turned in
the.

RDENING WOOD FOR PULLEYS.—After a wooden pulley is turned
ubbed smooth, boil it for about eight minutes in olive oil; then
it to dry, and it will become almost as hard as copper.

PURIFY GAS.—The purifier is to be filled with milk of lime,
by mixing 1 part of slaked lime with 25 parts of water. A
great improvement in the purification of gas has been effected
r. Statter, of England, by the employment of hydrated clay
with the lime employed for this purpose. Hydrated clay
s with the ammonia of the gas as with a base, and, at the
time, with its sulphuret of carbon as an acid, and thus removes
of these noxious impurities from the gas exposed to its influence.
sists also, in conjunction with the lime, in removing tarry
r and other impurities from the gas. The illuminating power
e gas is positively increased by the clay purification from 22
½ per cent.

JOINT LEAD PLATES.—The joints of lead plates for some pur-
are made as follows: The edges are brought together, ham-
d down into a sort of channel cut out of wood, and secured

with a few tacks. The hollow is then scraped clean with a scraper, rubbed over with candle grease, and a stream of hot lead is poured into it, the surface being afterwards smoothed with a red hot plumber's iron.

To Joint Lead Pipes.—Widen out the end of one pipe with a taper wood drift, and scrape it clean inside; scrape the end of the other pipe outside a little tapered, and insert it in the former: then solder it with common lead solder as before described; or, if it requires to be strong, rub a little tallow over, and cover the joint with a ball of melted lead, holding a cloth (2 or 3 plies of greased bed-tick) on the under side; and smoothing over with it and the plumber's iron.

Tinning Interior of Lead Pipes.—This invention consists in applying a flux of grease or muriate of zinc or any other flux that will protect the lead from oxidation, and insure a perfect coating of tin, when the tin is poured through the pipe or the pipe dipped into the bath of tin; after the lead pipe has been made, place the same in a vertical or nearly vertical position, and pass down through the same a strong cord, to which a weight is attached to draw the cord through the pipe; and at or near the other end of the cord a sponge, or piece of other porous or elastic material, is attached, of a size to fill the pipe, and of any desired length, say 6 inches more or less. The sponge or porous wad being saturated with the flux, is drawn through the pipe, and by its length ensures the covering of the entire inside surface of the inside of the pipes with the flux, so that the melted tin, subsequently applied, will adhere to all parts with uniformity and firmness.

To Soften Cast Iron for Turning.—Steep it in 1 part of aquafortis to 4 of water, and let it remain in 24 hours.

To Break Old up Cannon.—Old cannon and massive castings may be cut in two by a continuous stream of hot molten iron, which wears away the iron as a stream of hot water would eat into a mass of ice. Or the gun may be rolled on a frame to the mouth of a furnace, and the muzzle end shoved in as far as possible among other iron, the opening filled up and luted around the gun, the end of which is melted off. At the next charge shove it in another length, and so on until the breech is disposed of.

Large masses of cast iron may be broken up by drilling a hole in the most solid part, filling it with water, fitting a steelplug very accurately into the hole, and letting the drop of a pile driver descend on the plug.

Economic Lubricator.—India rubber, 4 lbs., dissolved in spirits turpentine; common soda, 10 lbs.; glue, 1 lb.; water, 10 gal.; oil 10 gal. Dissolve the soda and glue in the water by heat, then add the oil, and lastly the dissolved rubber, mix well by stirring.

To Lessen Friction in Machinery.—Grind together black lead with 4 times its weight of lard or tallow. Camphor is sometimes added (7 lbs. to the hundredweight).

Best Step for Turbine Wheels.—Swamp or rock maple is a better step than either lignum vitæ or elm for turbine wheels.

Water Annealing.—Heat the steel to a red heat, and let it lie a few minutes, until nearly black hot; then throw it into soap-suds;

steel in this way may be annealed softer than by putting it into the ashes of the forge.

Tempering Liquid.—To 7 quarts soft water, put in corrosive sublimate, 1½ oz.; common salt, 2 handfuls; when dissolved, it is ready for use. The first gives toughness to the steel, while the latter gives the hardness. Be careful with this preparation, as it is a dangerous poison.

Another.—Salt, 1 tea-cup; saltpetre, 1 oz.; alum, pulverized, 2 teaspoons; soft water, 2 gallons; never heat over a cherry red, nor draw any temper.

Another.—Saltpetre, sal-ammoniac, and alum, of each 4 oz.; salt, 3 lbs.; water, 6 gallons; and draw no temper.

Another.—Saltpetre and alum, each, 2 oz.; sal-ammoniac, ½ oz.; salt, 1½ lb.; soft water, 2 gallons. Heat to a cherry red, and plunge in, drawing no temper.

Another.—Water, 2 gal.; saltpetre, ½ oz.; pulverized borax, ½ oz.; sal-ammoniac, ½ oz.; white vitriol, 1 oz.; salt 1½ pt. Do not hammer too cold, nor heat too high. If you follow the directions previously given for tempering mill picks, you will generally come out all right.

Restoring Burnt Steel.—It is not generally known that burnt steel may be almost instantaneously restored by plunging it while hot in cold water, and hammering it with light strokes on the anvil, turning it so as to hammer all over it, again dipping in the cold water, and repeating the hammering process as before. Try it; if you don't succeed the first time, you will soon do so. We saw this done by Mr. T. S. Smith, while in Cincinnati, Ohio, and can vouch for the truth of this statement. Mr. Smith stated that it was an accidental discovery of his own.

Parker's Copper Hardening process is performed by introducing an admixture of a minute quantity of phosphorus into the metal.

Flux for Welding Copper.—Boracic acid, 2 parts; phosphate of soda, 1 part; mix. This welding powder should be strewn over the surface of copper at a red heat; the pieces should then be heated up to a full cherry red, or yellow heat, and brought immediately under the hammer. Heat the copper at a flame, or gas jet, where it will not touch charcoal or solid carbon.

To improve Poor Iron.—Black oxide of manganese, 1 part; copperas and common salt, 4 parts each; dissolve in soft water, and boil till dry; when cool, pulverize, and mix quite freely with nice welding sand. When you have poor iron which you cannot afford to throw away, heat it, and roll it in this mixture; working for a time, reheating, &c., will soon free it from all impurities, which is the cause of its rottenness. By this process you can make good horse-nails out of common iron.

Case-Hardening for Iron.—Cast iron may be case-hardened by heating to a red heat, and then rolling it in a composition composed of equal parts of prussiate of potash, sal-ammonia, and saltpetre, all pulverized and thoroughly mixed. This must be got to every part of the surface; then plunged, while yet hot, into a bath containing 2 oz. prussiate of potash, and 4 oz. sal-ammoniac to each gallon of cold water.

To Weld Cast Iron.—The best way of welding cast iron is to take it at a very intense heat, closely approaching the melting point. In this state it will be found sufficiently malleable to stand the operation of welding by the hammer. There are other methods, but most of them are attended by almost insurmountable difficulties.

Hardening and Filling for Fire-proof Safes.—Experience has shown that the fire and burglar-proof diamond chill for iron or steel, described in another part of this work, has no superior as a hardening for security in the construction of safes; and, as a non-conductor of heat, we would recommend a filling of plaster of Paris or alum. It is claimed by some that a mixture of both of these articles forms the best known filling for safes, as an external application of intense heat is certain to liberate a large quantity of water, which is transformed into steam, thus ensuing entire safety to the contents of the safe. Other manufacturers employ a concrete filling for safes, and extol it very highly. Mr. Moffat, gas and steamfitter, Boston, has informed me that he has applied for protection in the matter of a discovery by which he claims that he can fully protect a safe against a double blast furnace heat, by means of an outside lining of bricks composed of asbestos and kaolin, a very small portion only of the latter material being used. From the well known incombustible nature of these materials, there can be no reasonable doubt but that the claim in question is a just one.

For Malleable Iron.—Put the articles in an iron box, and stratify them among animal carbon, that is, pieces of horns, hoofs, skins, or leather, just sufficiently burned to be reduced to powder. Lute the box with equal parts of sand and clay; then place it in the fire, and keep at a light red heat for a length of time proportioned to the depth of steel required, when the contents of the box are emptied into water.

Another for Wrought Iron.—Take prussiate of potash, finely pulverized, and roll the article in it, if its shape admits of it; if not, sprinkle the powder upon it freely while the iron is hot.

To Soften Cast Iron for Drilling.—Heat to a cherry red, letting it lie level in the fire; then with a pair of cold tongs put on a piece of brimstone, a little less in size than the hole will be when drilled, and it softens entirely through the piece; let it lie in the fire until a little cool, when it is ready for drilling.

To temper Springs.—For tempering cast-steel trap springs, all that is necessary is to heat them in the *dark*, just so that you can see that they are red; then cool them in lukewarm water. You can observe a much lower degree of heat in the dark than by daylight, and the low heat and warm water give the desired temper.

Dipping Tools when Hardening.—To harden a penknife blade, lancet, razor, chisel, gouge-bit, plane, spoke-shave, iron shaving knife, three and four square files, and round and flat files, dip them endwise or perpendicularly. This keeps them straight, which would not be the case were they dipped in the water obliquely.

Cast Iron Ornaments are rendered susceptible of being finished with a scraper, where they cannot be reached with files, after having the following liquid applied to them.

Scaling Cast Iron.—Vitriol, 1 part; water, 2 parts; mix and lay on the diluted vitriol with some old cloth in the form of a brush, enough to wet the surface well: after 8 or 10 hours, wash off with water, when the hard, scaly surface will be completely removed.

Varnish for smooth moulding Patterns—Alcohol, 1 gal.; shellac, 1 lb.; lamp or ivory black, sufficient to color it.

Iron Lustre is obtained by dissolving a piece of zinc with muriatic acid, and mixing the solution with spirit of tar, and applying it to the surface of the iron.

To melt Steel as easily as Lead.—This apparent impossibility is performed by heating the bar of iron or steel red hot, and then touching it with a roll of brimstone, when the metal will drop like water. Red hot iron can be easily cut with a saw.

Patent Lubricating Oil.—Water, 1 gal.; clean tallow, 3 lbs.; palm oil, 10 lbs.; common soda, ½ lb. Heat the mixture to about 210° Fahr.; stir well till it cools down to 70° Fahr., when it is fit for use.

Black having a Polish for Iron.—Pulverized gum asphaltum, 2 lbs.; gum benzoin, ¼ lb.; spirits of turpentine, 1 gal.; to make quick, keep in a warm place, and shake often; shade to suit with finely ground ivory black. Apply with a brush. And it ought to be used on iron exposed to the weather as well as on inside work desiring a nice appearance or polish.

Varnish for Iron.—Asphaltum, 8 lbs.; melt in an iron kettle, slowly adding boiled linseed oil, 5 gals.; litharge, 1 lb.; and sulphate of zinc, ½ lb.; continuing to boil for 3 hours; then add dark gum amber, 1½ lb.; and continue to boil 2 hours longer. When cool, reduce to a proper consistence to apply with a brush, with spirits of turpentine.

Tempering Mill Picks.—Get double refined cast steel made expressly for mill picks. In drawing out the pick, use an anvil and hammer with smooth faces, and be careful not to heat the steel higher than a dark cherry red. Do not strike the pick on the edge when finishing it, but hammer it on the flat side, striking light and often, until the steel is quite dark, letting the blows fall so as to close the pores of the steel. When a dozen picks are ready to temper, get 2 gals. of rain water from which the chill should be taken, if in winter, by dipping a hot iron into it; add 2 lbs. salt, and it is ready for use. Heat your pick gradually from the centre; let the heat run to the point, and when it is a dark cherry red, dip the point vertically into the bath and hold it still. When the heat has left the part immersed, take it out, and cool the balance of the pick in ordinary water. Be sure to heat and hammer well.

Welding Cast Steel.—Rock saltpetre, ¼ lb.; dissolve in ¼ lb. oil vitriol; and add it to 1 gal. water. After scarfing the steel, get it hot; and quench in the preparation. Then weld it the same as a piece of iron, hammer it very quick with light blows. It answers the purpose much better than borax; cork it in a bottle, and it will keep for years.

Another.—Borax, 15 parts; sal-ammoniac, 3 parts; cyanide of potassium, 2 parts; dissolve all in water, and evaporate the water at a low temperature.

Case Hardening Compound.—Prussiate of potash, 3 lbs.; sal-ammoniac, 2 lbs.; bone dust, 2 lbs.

Another.—Pulverized borax any quantity, and slightly color it with dragon's blood. Heat the steel red hot, shake the borax over it; place it again in the fire till the borax smokes on the steel, which will be much below the ordinary welding heat, and then hammer it.

Cement to Resist Red Heat and Boiling Water.—To 4 or 5 parts of clay, thoroughly dried and pulverized, add 2 parts of fine iron filings free from oxide, 1 part of peroxyde of manganese, 1 part of common salt, and ½ part of borax. Mingle thoroughly, render as fine as possible, then reduce to a thick paste with the necessary quantity of water, mixing well; use immediately, and apply heat, gradually increasing almost to a white heat.

Cement to Join Sections of Cast-Iron Wheels, &c.—Make a paste of pure oxide of lead, litharge, and concentrated glycerine. Unrivalled for fastening stone to stone or iron to iron.

Varnish for Boilers.—Asphaltum dissolved in turpentine.

Soft Cement for Steam-boilers, Steam-pipes, &c.—Red or white lead, in oil, 4 parts; iron borings, 2 to 3 parts.

Hard Cement.—Iron borings and salt water, and a small quantity of sal-ammoniac, with fresh water.

Metal Polish.—Rotten-stone, followed by Paris white and rouge.

Gasfitters' Cement.—Mix together resin, 4½ parts; wax, 1 part; and Venetian red, 3 parts.

Plumbers' Cement.—Black resin, 1 part; brick dust, 2 parts, well incorporated by a melting heat.

Coppersmiths' Cement.—Boiled linseed oil and red lead mixed together into a putty, are often used by coppersmiths and engineers to secure joints; the washers of leather or cloth are smeared with this mixture in a pasty state.

Compositions to Fill Holes in Castings.—Mix 1 part of borax in solution with 4 parts dry clay. *Another:* Pulverized binoxide of manganese, mixed with a strong solution of silicate of soda (water clay) to form a thick paste.

Cast Iron Cement.—Clean borings, or turnings of cast iron, 16 parts; sal-ammoniac, 2 parts; flour of sulphur, 1 part; mix them well together in a mortar, and keep them dry. When required for use, take of the mixture, 1 part; clean borings, 20 parts; mix thoroughly, and add a sufficient quantity of water. A little grindstone dust added improves the cement.

Cement for Steam-pipe Joints, etc., with Faced Flanges.—White lead, mixed, 2 parts; red lead, dry, 1 part; grind, or otherwise mix them to a consistence of thin putty; apply interposed layers with 1 or 2 thicknesses of canvas, or gauze wire, as the necessity of the case may be.

Cement for Joints of Iron Pipes or Holes in Castings.—Take of iron borings, coarsely powdered, 5 lbs.; of powdered sal-ammoniac, 2 oz.; of sulphur, 1 oz., and water sufficient to moisten it. This composition hardens rapidly, but, if time can be allowed, it sets more firmly without the sulphur. Use as soon as mixed, and ram tightly into the joints or holes.

Black Varnish for Coal Buckets.—Asphaltum, 1 lb.; lamp-black, ¼ lb.; resin, ½ lb.; spirits of turpentine, 1 qt. Dissolve the asphaltum and resin in the turpentine, then rub up the lamp-black with linseed oil, only sufficient to form a paste, and mix with the others. Apply with a brush.

Soldering Fluid.—Take 2 oz. muriatic acid; add zinc till bubbles cease to rise; add ½ teaspoonful of sal-ammoniac.

Japan Flow for Tin.—All Colors.–Gum sandarach, 1 lb.; balsam of fir, balsam of tolu, and acetate of lead, of each, 2 oz.; linseed oil, ½ pint; spirits of turpentine, 2 qts. Put all into a suitable kettle, except the turpentine, over a slow fire at first; then raise to a higher heat till all are melted; now take from the fire, and, when a little cool, stir in the spirits of turpentine, and strain through a fine cloth. This is transparent; but by the following modifications, any or all of the various colors are made from it:

2. **Black.**—Prussian blue, 1 oz.; asphaltum, 2 oz.; spirits of turpentine, ½ pint. Melt the asphaltum in the turpentine; rub up the blue with a little of it; mix well, and strain; then add the whole to 1 pint of the *first*, above.

3. **Blue.**—Indigo and Prussian blue, both finely pulverized, of each ½ oz.; spirits of turpentine, 1 pint. Mix well, and strain. Add of this to 1 pint of the *first* until the color suits.

4. **Red.**—Take spirits of turpentine, ½ pt.; add cochineal, ½ oz.; let stand 15 hours and strain. Add of this to the *first* to suit the fancy. If carmine is used instead of cochineal, it will make a fine color for watch hands.

5. **Yellow.**—Take 1 oz. of pulverized root of curcuma, and stir of it into 1 pt. of the *first* until the color pleases you; let stand a few hours, and strain.

6. **Green.**—Mix equal parts of the blue and yellow together, then mix with the *first* until it suits the fancy.

7. **Orange.**—Mix a little of the red with more of the yellow, and then with the *first* as heretofore, until pleased.

8. **Pink.**—Mix a little of the blue to more in quantity of the red, and then with the *first* until suited. Apply with a brush.

Transparent Blue for Iron or Steel.—Demar varnish, ½ gal.; fine ground Prussian blue, ½ oz,; mix thoroughly. Makes a splendid appearance. Excellent for bluing watch-hands.

To Tin Copper Stew Dishes, &c.—Wash the surface of the article to be tinned with sulphuric acid, and rub the surface well, so as to have it smooth and free of blackness caused by the acid; then sprinkle calcined and finely pulverized sal-ammoniac upon the surface, holding it over a fire, when it will be sufficiently hot to melt a bar of solder which is to be rubbed over the surface. Any copper dish or vessel may be tinned in this way.

To Copper the Surface of Iron, Steel, or Iron Wire.—Have the article perfectly clean, then wash with the following solution, and it presents at once a coppered surface. Rain water, 3 lbs.; sulphate of copper, 1 lb.

Black Bronze on Iron or Steel.—The following mixtures are employed: liquid No. 1. A mixture of bichloride of mercury and sal-ammoniac. No. 2, A mixture of perchloride of iron, sulphate of copper, nitric acid, alcohol and water. No. 3. Perchloride and protochloride of mercury mixed with nitric acid, alcohol and water. No. 4. A weak solution of sulphide of potassium. Clean your metal well and apply a slight coat of No. 1 with a sponge; when quite dry, apply another coat. Remove the resulting crust of oxide with a wire brush, rub the metal with a clean rag, and repeat this operation after each application of these liquids. Now apply several coats of No. 2, and also of No. 3, with a full sponge; then, after drying for ten minutes, throw the pieces of metal into water heated near the boiling point; let them remain in the water from 5 to 10 minutes according to their size. After being cleaned, cover again with several coatings of No. 3, afterwards with a strong coating of No. 4; then again immerse in the bath of hot water. Remove from the bath, dry, and wipe the pieces with carded cotton dipped in liquid No. 3, diluted each time with an increased quantity of water; then rub and wipe them with a little olive oil; again immerse in a water bath heated to 140° Fahr., remove them, rub briskly with a woollen rag, and lastly, with oil. Unequalled for producing a beautiful glossy black on gun-barrels, steel, iron, &c.

TINNING SMALL ARTICLES.—Dissolve as much zinc scraps in muriatic acid as it will take up, let it settle, then decant the clear, and it is ready for use. Next prepare a suitable iron vessel, set it over the fire, put your tin therein, and melt it, and put as much mutton or beef tallow as will cover the tin about ¼ inch thick. This prevents the oxidation of the metal; but be very careful that the tallow does not catch fire. The iron, or any other metal to be tinned, must be *well cleaned*, either with scraping, filing, polishing with sand, or immersion in diluted vitriol. Proceed to wet the articles in the zinc solution, then carefully immerse them in the tallow and melted tin; in a very short time they will be perfectly tinned, when they may be taken out.

GOLD LACQUER FOR TIN.—TRANSPARENT, ALL COLORS.-Alcohol in a flask, ½ pt.; add gum shellac, 1 oz; turmeric, ½ oz.; red sanders, ¾ oz. Set the flask in a warm place, shake frequently for 12 hours or more, then strain off the liquor, rinse the bottle, and return it, corking tightly for use.

When this varnish is used, it must be applied to the work freely and flowing, and the articles should be hot when applied. One or more coats may be laid on, as the color is required more or less light or deep. If any of it should become thick from evaporation, at any time, thin it with alcohol. And by the following modifications, all the various colors are obtained:

2. ROSE COLOR.—Proceed as above, substituting ¼ oz. of finely ground best lake in place of the turmeric.

3. BLUE.—The blue is made by substituting pulverized Prussian blue, ½ oz., in place of the turmeric.

4. PURPLE.—Add a little of the blue to the *first*.

5. GREEN.—Add a little of the rose-color to the *first*.

CRYSTALLIZED TIN-PLATE.—The figures are more or less beautiful and diversified, according to the degree of heat and relative dilution of the acid. Place the tin-plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of 4 parts of aquafortis and 2 of distilled water, holding 1 part of common salt or sal-ammoniac in solution. Whenever the crystalline spangles seem to be thoroughly brought out, the plate must be immersed in water, washed either with a feather or a little cotton (taking care not to rub off the film of tin that forms the feathering), forthwith dried with a low heat, and coated with a lacquer varnish, otherwise it loses its lustre in the air. If the whole surface is not plunged at once in cold water, but if it be partially cooled by sprinkling water on it, the crystallisation will be finely variegated with large and small figures. Similar results will be obtained by blowing cold air through a pipe on the tinned surface, while it is just passing from the fused to the solid state.

To Crystallize Tin.—Sulphuric acid, 4 oz.; soft water, 2 to 3 oz., according to strength of the acid; salt, 1½ oz. Mix. Heat the tin hot over a stove, then, with a sponge apply the mixture, then wash off directly with clean water. Dry the tin, and varnish with demar varnish.

To Clean and Polish Brass.—Oil of vitriol, 1 oz.; sweet oil, ½ gill; pulverized rotten stone, 1 gill; rain water, 1½ pts. Mix all, and shake as used. Apply with a rag, and polish with buckskin or old woollen.

Silvering Powder.—Nitrate of silver and common salt, of each, 30 grs.; cream of tartar, 3½ drs. Pulverize finely, mix thoroughly, and bottle for use. Unequalled for polishing copper and plated goods.

Tin Cans.—Size of Sheet, for from 1 to 100 Gallons.

For 1	gallon,	7 by 20	inches.	For 25	gallons,	30 by 56	inches.
3½	"	10 by 28	"	40	"	36 by 63	"
5	"	12 by 40	"	50	"	40 by 70	"
6	"	14 by 40	"	75	"	40 by 84	"
10	"	20 by 42	"	100	"	40 by 98	"
15	"	30 by 42	"				

This includes all the laps, seams, &c., which will be found sufficiently correct for all practical purposes.

Tinning Iron.—Cleanse the metal to be tinned, and rub with a coarse cloth, previously dipped in hydrochloric acid (muriatic acid), and then rub on French putty with the same cloth. French putty is made by mixing tin filings with mercury.

Tinning.—1. Plates or vessels of brass or copper boiled with a solution of stannate of potassa, mixed with turnings of tin, become, in the course of a few minutes, covered with a firmly attached layer of pure tin. 2. A similar effect is produced by boiling the articles with tin-filings and caustic alkali, or cream of tartar. In the above way, chemical vessels made of copper or brass may be easily and perfectly tinned.

New Tinning Process.—Articles to be tinned are first covered with dilute sulphuric acid, and, when quite clean, are placed in warm water, then dipped in a solution of muriatic acid, copper, and zinc, and then plunged into a tin bath to which a small quantity of zinc has been added. When the tinning is finished, the articles are taken out, and plunged into boiling water. The operation is completed by placing them in a very warm sand-bath. This last process softens the iron.

Kustitien's Metal for Tinning.—Malleable iron, 1 lb., beat to whiteness; add 5 oz. regulus of antimony, and Molucca tin, 24 lbs.

Galvanizing Iron.—The iron plates are first immersed in a cleansing bath of equal parts of sulphuric or muriatic acid and water used warm; they are then scrubbed with emery or sand, to clean them thoroughly and detach all scales if any are left; after which they are immersed in a "preparing bath" of equal parts of saturated solutions of chloride of zinc and chloride of ammonium, from which bath they are directly transferred to the fluid "metallic bath," consisting, by weight, of 640 lbs. zinc to 106 lbs. of mercury, to which are added from 5 to 6 oz. of sodium. As soon as the iron has attained the temperature of this hot fluid bath, which is 680° Fahr., it may be removed, and will then be found thoroughly coated with zinc. A little tallow on the surface of the metallic bath will prevent oxidation.

Paste for Cleaning Metals.—Take oxalic acid, 1 part; rottenstone, 6 parts; mix, with equal parts of train oil and spirits of turpentine, to a paste.

To Prevent Iron or Steel from Rusting.—Warm your iron or steel till you cannot bear your hand on it without burning yourself, then rub it with new and clean white wax. Put it again to the fire till it has soaked in the wax. When done, rub it over with a piece of serge. This prevents the metal from rusting afterwards.

Bronzing Liquids for Tin Castings.—Wash them over, after being well cleaned and wiped, with a solution of 1 part of sulphate of iron and 1 of sulphate of copper, in 20 parts of water; afterwards, with a solution of 4 parts verdigris in 11 of distilled vinegar; leave for an hour to dry and then polish with a soft brush and colcothar.

Fancy Colors on Metals.—1. Dissolve 4 oz. hypo-sulphite of soda in 1½ pts. of water, and then add a solution of 1 oz. acetate of lead in 1 oz. of water. Articles to be colored are placed in the mixture, which is then gradually heated to the boiling point. This will give iron the color of blue steel, zinc becomes bronze, and copper or brass becomes, successively, yellowish, red, scarlet, deep blue, light blue, bluish white, and finally white, with a tinge of rose. 2. By replacing the acetate of lead in the solution by sulphate of copper, brass becomes, first, of a fine rosy tint, then green, and lastly, of an irridescent brown color.

Coating Iron Castings with Gold or Silver.—The articles to be gilded are well cleaned and boiled in a porcelain vessel, together with 12 parts of mercury, 1 of zinc, 2 of iron vitriol, 1½ of muriatic acid of 1.2 specific gravity, and 12 parts of water; in a short time a layer of mercury will deposit upon the iron, and upon this the gold amalgam may be uniformly distributed. Iron to be silvered is first provided with a coating of copper, upon which the silver is applied either by means of amalgam or silver leaf.

Brunswick Black for Grates, &c.—Asphaltum, 5 lbs.; melt, and add boiled oil, 2 lbs.; spirits of turpentine, 1 gal. Mix.

Bronze Paint for Iron.—Ivory black, 1 oz.; chrome yellow, 1 oz.; chrome green, 2 lbs.; mix with raw linseed oil, adding a little japan to dry it, and you have a very nice bronze green. If desired, gold bronze may be put on the prominent parts, as on the or edges of an iron railing, when the paint is *not* quite dry, g a piece of velvet or plush to rub on the bronze.

UING ON REVOLVERS AND GUN BARRELS is performed by simply ng the piece to be blued in powdered charcoal over a fire until lesired color is obtained.

OWNING FOR GUN BARRELS.—Spirits of nitre, 1 lb.; alcohol, 1 corrosive sublimate, 1 oz.; mix in a bottle, and cork for use. ctions: polish the barrel perfect; then rub it with quick lime a cloth, which removes grease and dirt; now apply the ning fluid with a clean white cloth, apply one coat, and set it warm dark place for from 10 to 20 hours, until a red rust forms ; then card it down with a gunmaker's card, and rub off with an cloth. Repeat the process if you wish a dark shade.

OWNING FOR TWIST BARRELS.—Spirits of nitre, ¾ oz.; tincture eel, ¾ oz.; or use the unmedicated tincture of iron if the tinc- of steel cannot be obtained; black brimstone, ¼ oz.; blue ol, ½ oz., corrosive sublimate, ¼ oz.; nitric acid, 1 dram; eras, ¼ oz.; mix with 1½ pints rain water, and bottle for use is to be applied the same as the first; it causes the twist of arrel to be visible after application, a quality which the other 1 does not possess.

OWNING COMPOSITIONS FOR GUN BARRELS.—1. Blue vitriol, 4 tincture of muriate of iron, 2 oz.; water, 1 qt.; dissolve, and aquafortis and sweet spirits of nitre, of each, 1 oz. 2. Blue ol and sweet spirits of nitre, of each 1 oz.; aquafortis, ½ oz.; r, 1 pint. To be used in the same manner as previously ibed in this work.

RNISH AND POLISH FOR GUN STOCKS.—Gum shellac, 10 oz.; gum arach, 1 oz.; Venice turpentine, 1 dr.; 98 per cent. alcohol, 1 shake the jug occasionally for a day or two, and it is ready se. Apply a few coats of this to your gun stocks, polish by ng smooth, and your work is complete.

ASS FOR HEAVY CASTINGS.—Copper, 6 to 7 parts; tin, 1 part; 1 part.

LLOW BRASS (*for casting*).—1. Copper, 61.6 parts; zinc, 35.3 ; lead, 2.9 parts; tin, 0.2 parts. 2. *Brass of Jemappes.*— er, 64.6 parts; zinc, 33.7 parts; lead, 1.4 parts; tin, 0.2 parts. *eet Brass of Stolberg, near Aix la Chapelle.*—Copper, 64.8 ; zinc, 32.8 parts; lead, 2.0 parts; tin, 0.4 parts. 4. *D'Arcets s for Gilding.*—Copper, 63.70 parts; zinc, 33.55 parts; lead, parts; tin, 2.50 parts. 5. *Another.*—Copper, 64.45 parts; zinc, parts; lead, 2.86 parts; tin, 0.25 parts. 6. *Sheet Brass of lly.*—Copper, 70.1 parts; zinc, 29.9 parts. 7. *English Brass* .—Copper, 70.29 parts; zinc, 29.26 parts; lead, 0.28 parts; .17 parts. 8. *Augsburg Brass Wire.*—Copper, 71.89 parts; 27.63 parts, tin, 0.85 parts.

D BRASS, FOR GILT ARTICLES.—1. Copper, 82.0 parts; zinc, 18.0 ; lead, 1.5 parts; tin, 3.0 parts. 2. *Another.*—Copper, 82 ; zinc, 18 parts; lead, 0 parts; tin, 1 part. 3. *Another.*— cr, 82.3 parts; zinc, 17.5 parts; tin, 0.2 parts. 4. *French ac for Sword Handles.*—Copper, 80 parts; zinc, 17 parts; tin, ts. 5. *For Parisian Ornaments.*—Copper, 85 parts; zinc, 15 ; tin, a trace. 6. *Used for German Ornaments.*—Copper, 85.3

parts; zinc, 14.7 parts. 7. *Chrysochalk.*—Copper, 90.0 parts; zinc, 7.9 parts; lead, 1.6 parts. 8. *Red Tombac from Paris.*—Copper, 92 parts; zinc, 8 parts.

COMPOSITIONS.—1. *For strong pumps, &c.*—Copper, 1 lb.; zinc, ½ oz.; tin, 1½ oz. 2. *For toothed wheels.*—Copper, 1 lb.; brass, 2 oz.; tin, 2 oz. 3. Copper, 1 lb.; brass, 2 oz.; tin, 1¼ oz. 4. *For turning work.*—Copper, 1 lb.; brass, 1½ oz.; tin, 2 oz. 5. *For nuts of coarse threads and bearings.*—Copper, 1 lb.; brass, 1½ oz.; tin, 2¼ oz. 6. *For bearings to sustain great weights.*—Copper, 1 lb.; zinc, ½ oz.; tin, 2½ oz. 7. *Pewterers' temper.*—Tin, 2 lbs.; copper, 1 lb. Used to add in small quantities to tin. 8. *Hard bearings for machinery.*—Copper, 1 lb.; tin, 2 oz. 9. *Very hard ditto.*—Copper, 1 lb.: tin, 2½ oz.

ANTI-FRICTION METAL.—1. Copper, 4 lbs.; regulus of antimony, 8 lbs.; Banca tin, 96 lbs. 2. Grain zinc, 7½ lbs.; purified zinc, 7¼ lbs.; antimony, 1 lb. 3. Zinc, 17 parts; copper, 1 part; antimony, 1½ parts. This possesses unsurpassable anti-friction qualities, and does not require the protection of outer casings of a harder metal. 4. Block tin, 8 lbs.; antimony, 2 lbs.; copper, 1 lb. If the metal be too hard, it may be softened by adding some lead. 5. The best alloy for journal boxes is composed of copper, 24 lbs.; tin, 24 lbs.; and antimony, 8 lbs. Melt the copper first, then add the tin, and lastly the antimony. It should be first run into ingots, then melted, and cast in the form required for the boxes. 6. Melt in a crucible 1½ lbs. of copper, and, while the copper is melting melt in a ladle 25 lbs. of tin and 3 of antimony, nearly red hot, pour the two together, and stir until nearly cool. This makes the finest kind of lining metal. 7. *Very cheap.* Lead, 100 lbs.; antimony, 15 lbs. This costs about 10 cents per lb.

YELLOW BRASS FOR TURNING.-(Common article.)-Copper, 20 lbs.; zinc, 10 lbs.; lead, 4 oz.

RED BRASS, FREE, FOR TURNING.—Copper, 160 lbs.; zinc, 50 lbs.; lead, 10 lbs.; antimony, 44 oz.

ANOTHER BRASS FOR TURNING.—Copper, 32 lbs.; zinc, 10 lbs.; lead, 1 lb.

BEST RED BRASS, FOR FINE CASTINGS.—Copper, 24 lbs.; zinc, 5 lbs.; bismuth, 1 oz. Put in the bismuth last before pouring off.

BRONZE METAL.—Copper, 7 lbs.; zinc, 3 lbs.; tin, 2 lbs.

BRONZE METAL.—Copper, 1 lb.; zinc, 12 lbs.; tin, 8 lbs.

BELL METAL, FOR LARGE BELLS.—Copper, 100 lbs.; tin, from 20 to 25 lbs.

BELL METAL FOR SMALL BELLS.—Copper, 3 lbs.; tin, 1 lb.

COCK METAL.—Copper, 20 lbs.; lead, 8 lbs.; litharge, 1 oz.; antimony, 3 oz.

HARDENING FOR BRITANNIA.—(To be mixed separately from the other ingredients.)—Copper, 2 lbs.; tin, 1 lb.

GOOD BRITANNIA METAL.—Tin, 150 lbs.; copper, 3 lbs.; antimony, 10 lbs.

BRITANNIA METAL, 2d QUALITY.—Tin, 140 lbs.; copper, 3 lbs.; antimony, 9 lbs.

BRITANNIA METAL, FOR CASTING.—Tin, 210 lbs.; copper, 4 lbs.; antimony, 12 lbs.

Britannia Metal, for Spinning.—Tin, 100 lbs.; Britannia hardening, 4 lbs.; antimony, 4 lbs.

White Solder, for raised Britannia Ware.—Tin, 100 lbs.; copper, 3 oz., to make it free; and lead, 3 oz.

Britannia Metal, for Registers.—Tin, 100 lbs.; hardening, 8 lbs.; antimony, 8 lbs.

Best Britannia for Spouts.—Tin, 140 lbs.; copper, 3 lbs.; antimony, 6 lbs.

Best Britannia for Spoons.—Tin, 100 lbs.; hardening, 5 lbs.; antimony, 10 lbs.

Best Britannia for Handles.—Tin, 140 lbs.; copper, 2 lbs.; antimony, 5 lbs.

Best Britannia, for Lamps, Pillars, and Spouts.—Tin, 300 lbs.; copper, 4 lbs.; antimony, 15 lbs.

Casting.—Tin, 100 lbs.; hardening, 5 lbs.; antimony, 5 lbs.

Lining Metal for Boxes of Railroad Cars.—Mix tin, 24 lbs.; copper, 4 lbs.; antimony, 8 lbs.; (for a hardening), then add tin, 72 lbs.

Fine Silver Colored Metal.—Tin, 100 lbs.; antimony, 8 lbs.; copper, 4 lbs.; bismuth, 1 lb.

German Silver, First Quality, for Casting.—Copper, 50 lbs.; zinc, 25 lbs.; nickel, 25 lbs.

German Silver, Second Quality, for Casting.—Copper, 50 lbs.; zinc, 20 lbs.; nickel (best pulverized), 10 lbs.

German Silver, for Rolling.—Copper, 60 lbs.; zinc, 20 lbs.; nickel, 25 lbs.

German Silver, for Bells, and other Castings.—Copper, 60 lbs.; zinc, 20 lbs.; nickel, 20 lbs.; lead, 3 lbs.; iron (that of tin plate being best), 2 lbs.

Imitation of Silver.—Tin, 3 oz.; copper, 4 lbs.

Pinchbeck.—Copper, 5 lbs.; zinc, 1 lb.

Tombac.—Copper, 16 lbs.; tin, 1 lb.; zinc, 1 lb.

Red Tombac.—Copper, 10 lbs.; zinc, 1 lb.

Hard White Metal.—Sheet brass, 32 oz.; lead, 2 oz.; tin, 2 oz.; zinc, 1 oz.

Metal for taking Impressions.—Lead, 3 lbs.; tin, 2 lbs.; bismuth, 5 lbs.

Spanish Tutania.—Iron or steel, 8 oz.; antimony, 16 oz.; nitre, 3 oz. Melt and harden 8 oz. tin with 1 oz. of the above compound.

Rivet Metal.—Copper, 32 oz.; tin, 2 oz.; zinc, 1 oz.

Rivet Metal, for Hose.—Tin, 64 lbs.; copper, 1 lb.

Fusible Alloy.—(Which melts in boiling water.)—Bismuth, 8 oz.; tin, 3 oz.; lead, 5 oz.

Fusible Alloy, for Silvering Glass.—Tin, 6 oz.; lead, 10 oz.; bismuth, 21 oz.; mercury, a small quantity.

Best Soft Solder, for Cast Britannia Ware.—Tin, 8 lbs.; lead, 5 lbs.

Brass Solder.—1. Copper, 61.25 parts; zinc, 38.75 parts; 2. (Yellow and easily fusible) copper, 45 parts; zinc, 55 parts; 3. (White) copper, 57.41 parts; tin, 14.60 parts; zinc, 27.99 parts.

Spelter Solder. Equal parts copper and zinc.

Solder for Copper.—Copper, 10 lbs.; zinc, 9 lbs.

Yellow Solder, for Brass or Copper.—Copper, 32 lbs.; zinc, 29 lbs.; tin, 1 lb.

Black Solder.—Copper, 2 lbs.; zinc, 3 lbs.; tin, 2 oz.

Black Solder.—Sheet brass, 20 lbs.; tin, 6 lbs.; zinc, 1 lb.

Pewterers' Soft Solders.—1. Bismuth, 2; lead, 4; tin, 3 parts. 2. Bismuth, 1; lead, 1; tin, 2 parts.

Plumbers' Solder.—Lead, 3 parts; tin, 1 part.

Solder.—*For lead*, the solder is one part tin, 1 to 2 of lead; for *tin*, 1 to 2 parts tin to one of lead; for *zinc*, 1 part tin to 1 to 2 of lead; for *pewter*, 1 part tin to 1 of lead, and 1 to 2 parts of bismuth.

The surfaces to be joined are made perfectly clean and smooth, and then covered with sal-ammoniac, or resin, or both; the solder is then applied, being melted in, and smoothed over by the soldering iron.

To Solder Iron to steel, or either to Brass.—Tin, 3 parts; copper, 39½ parts; zinc, 7½ parts. When applied in a molten state it will firmly unite the metals first named to each other.

Coppersmiths' Solder.—Tin, 2 parts; lead, 1 part. When the copper is thick, heat it by a naked fire; if thin, use a tinned copper tool. Use muriate or chloride of zinc, or resin, as a flux. The same solder will do for *iron*, *cast iron*, or *steel;* if thick, heat by a naked fire, or immerse in the solder.

Cold Brazing, without a fire or Lamp.—Fluoric acid, ½ oz.; oxymuriatic acid, ½ oz.; mix in a lead bottle. Put a chalk mark each side where you want to braze. This mixture will keep about 6 months in one bottle.

Plumbers' Solder.—Bismuth, 1 part; lead, 5 parts; tin, 3 parts is a first class composition.

Cold Soldering *without fire or lamp.*—Bismuth, ¼ oz.; quicksilver, ¼ oz.; block tin filings, 1 oz.; spirits salts, 1 oz., mixed together.

New and Beautiful Alloys.—Copper, 69.8 parts; nickel, 19.8 parts; zinc 5.5 parts; cadmium, 4.7 parts; used for spoons, forks, &c. *Another.* Copper, 89.3 parts; aluminum, 10.5 parts. *Oreide resembling Gold.* Copper, 79.7 parts; zinc, 83.05 parts; nickel, 6.09 parts, with a trace of iron and tin.

Chinese White Copper.—Copper, 40.4; nickel, 31.6; zinc, 25.4; and iron, 2.6 parts.

Bath Metal.—Brass, 32 parts; zinc, 9 parts.

Speculum Metal.—Copper, 6; tin, 2; and arsenic, 1 part. Or, copper, 7; zinc, 3; and tin, 4 parts.

Britannia Metal.—Brass, 4 parts; tin, 4 parts; when fused, add bismuth, 4; and antimony, 4 parts. This composition is added at discretion to melted tin.

Superior Bell Metal.—Copper, 100 lbs.; tin, 23 lbs.

Electrum.—Copper, 8; nickel, 4; zinc, 3½ parts. This compound is unsurpassed for ease of workmanship and beauty of appearance.

Tinmans' Solder.—Lead, 1; tin, 1 part.

Pewterers' Solder.—Tin, 2; lead, 1 part.

Common Pewter.—Tin, 4; lead, 1 part.

Best Pewter.—Tin, 100; antimony, 17 parts.

Queen's Metal.—Tin, 9; antimony, 1; bismuth, 1; lead, 1 part.

Watch-Makers' Brass.—Copper, 1 part; zinc, 2 parts.

A Metal that expands in Cooling.—Lead, 9; antimony, 2; ismuth, 1 part. This metal is very useful in filling small defects iron castings, &c.

German Brass.—Copper, 1 part; zinc, 1 part.

Albata Metal.—Nickel, 3 to 4 parts; copper, 20 parts; zinc, 16 arts. Used for plated goods.

British Plate.—Nickel, 5 to 6 parts; copper, 20 parts; zinc, 8 o 10 parts. Used for plated goods.

Chantry's Hard Alloy.—Copper, 1 lb.; zinc, 2½ oz.; tin, 2½ oz. azors as hard as tempered steel have been made from this alloy.

Hard White Metal for Buttons.—Brass, 1 lb.; zinc, 2 oz.; tin, oz.

Birmingham Platin.—Copper, 8 parts; zinc, 5 parts.

German Silver.—1. Copper, 40.62 parts; zinc, 43.76 parts; ickel, 15.62 parts. 2. Copper, 41.47 parts; zinc, 26.08 parts; ickel, 32.45 parts. 3. Copper, 55.55 parts; zinc, 5.55 parts; ickel, 38.90 parts. 4. Copper, 53.40 parts; zinc, 29.10 parts; ickel, 17.50 parts. 5. (*Alfenide* contains a trace of iron)—opper, 59.60 parts; zinc, 30.30 parts; nickel, 10.10 parts.

Britannia Metal.—1. Copper, 0.30 parts; tin, 89.70 parts; zinc, .30 parts; antimony, 9.70 parts. 2. Copper, 1.85 parts; tin, 81.64 arts; antimony, 16.51 parts. 3. Copper, 0.91 parts; tin, 89,97 arts; antimony, 9.12 parts. 4. Tin, 90.00 parts; antimony, 10 arts. 5. Copper, 1.78 parts; tin, 89.30 parts; antimony, 7.14 arts; bismuth, 1.78 parts.

Gun Metal.—Copper, 90 parts; tin, 10 parts.

Melting Point of Metals.—Iron fuses at 2787° Fahr.; gold at 016°; silver, 1873°; copper, 1996°; zinc, 773°; antimony, 09°; bismuth, 476 to 507°; nickel, 630°; tin, 442°; lead, 334°; ercury volatilizes at 670°.

Chinese Gong Metal.—Copper, 78.00 parts; tin, 22.00.

Alloy for Gun Mountings.—Copper, 80 parts; tin, 3; zinc, 17.

White Metal for Table Bells.—Copper, 2.06 parts; tin, 97.31 arts; bismuth, 0.63 parts.

Clock Bell Metal.—Copper, 75.19 parts, tin, 24.81 parts.

Socket Metal for Locomotive Axle-trees.—1. Copper, 86.03; in, 13.97; 2. (*French*) Copper, 82 parts; tin, 10 parts; zinc, parts; 3. (*Stephenson's*) Copper, 79 parts; tin, 8 parts; zinc, 5 arts; lead, 8 parts; 4. (*Belgian*) Copper, 89.02 parts; tin, 2.44 arts; zinc, 7.76 parts; iron, 0.78 parts; 5. (*English*) Copper, 73.96 arts; tin, 9.49 parts; zinc, 9.03 parts; lead, 7.09 parts; iron, 0.43 arts.

Brass.—1. Copper, 73 parts; zinc, 27 parts; 2. Copper, 65 parts; inc, 35 parts; 3. Copper, 70 parts; zinc, 30 parts.

Alloy for Mechanical Instruments.—Copper, 1 lb.; tin, 1 oz.

Malleable Brass.—1. Copper, 70.10 parts; zinc, 29.90 parts; 2. *Superior*) Copper, 60 parts; zinc; 40 parts.

Button Makers' Metal.—1. Copper, 43 parts; zinc, 67 parts; 2. opper, 62.22 parts; tin, 2.78 parts; zinc, 35 parts; 3. Copper, 8.94 parts; tin, 5.28 parts; zinc, 35.78 parts.

Metal for Sliding Levers of Locomotives.—1. Copper, 85.25 arts; tin, 12.75 parts; zinc, 2.00 parts; 2. (*Fenton's*) Copper, 5.50 arts; tin, 14.50 parts; zinc, 80 parts.

Alloy for Cylinders of Locomotives.—Copper, 88.63 parts; tin, 2.38 parts; zinc, 6.99 parts.

Alloy for Stuffing Boxes of Locomotives.—Copper, 90.06 parts; tin, 3.56 parts; zinc, 6.38 parts.

Amalgam for Mirrors.—1. Tin, 70 parts; mercury, 30 parts; 2. (*For curved mirrors*) Tin, 80 parts; mercury, 20 parts; 3. Tin, 8.33 parts; lead, 8.34 parts; bismuth, 8.33 parts; mercury, 75 parts; 4. (*For spherical mirrors*) Bismuth, 80 parts; mercury, 26 parts.

Reflector Metal.—1. (*Duppler's*)Zinc, 20 parts; silver, 80 parts; 2. Copper, 66.22 parts; tin, 33.11 parts; arsenic, 0.67 parts; 3. (*Cooper's*) Copper, 57.86 parts; tin, 27.28 parts; zinc, 3.30 parts; arsenic, 1.65 parts; platinum, 9.91 parts; 4. Copper, 64 parts; tin, 32.00 parts; arsenic, 4.00 parts; 5. Copper, 82.18 parts; lead, 9.22 parts; antimony, 8.60 parts; 6. (*Little's*) Copper, 69.01 parts; tin, 30.82 parts; zinc, 2.44 parts; arsenic, 1.83 parts.

Metal for Gilt Wares.—1. Copper, 78.47 parts; tin, 2.87 parts; zinc, 17.23 parts; lead, 1.43 parts; 2. Copper, 64.43 parts; tin, 0.25 parts; zinc, 32.44 parts; lead, 2.86 parts; 3. Copper, 72.43 parts; tin, 1.87 parts; zinc, 22.75 parts; lead, 2.96 parts; 4. Copper, 70.90 parts; tin, 2.00 parts; zinc, 24.05 parts; lead, 3.05.

Spurious Silver Leaf.—Tin, 90.09 parts; zinc, 9.91 parts.

Shot Metal.—1. Lead, 97.06 parts; arsenic, 2.93 parts; 2. Lead, 99.60 parts; arsenic, 0.40 parts.

Bismuth Solder.—Tin, 33.33 parts; lead, 33.33 parts; bismuth 33.34 parts.

Glaziers' Solder.—Tin, 3 parts; lead, 1 part.

Amalgam for Electrical Machines.—1. Tin, 25 parts; zinc, 25 parts; mercury, 50 parts. 2. Tin, 11.11 parts; zinc, 22.22 parts; mercury, 66.67 parts.

Type Metal.—1. *For smallest and most brittle types.*—Lead, 3 parts; antimony, 1 part. 2. *For small, hard, brittle types.*—Lead, 4 parts; antimony, 1 part. 3. *For types of medium size.*—Lead, 5 parts; antimony, 1 part. 4. *For large types.*—Lead, 6 parts; antimony, 1 part. 5. *For largest and softest types.*—Lead, 7 parts; antimony, 1 part. In addition to lead and antimony, type metal also contains 4 to 8 per cent. of tin, and sometimes 1 to 2 per cent. of copper. Stereotype plates are made of lead, 20 parts; antimony, 4 parts; tin, 1 part.

Brass for Wire.—Copper, 34 parts; calamine, 56 parts: mix.

Britannia Metal.—1. Tin, 82 parts; lead, 18 parts; brass, 5 parts; antimony, 5 parts; mix. 2. Brass, 1 part; antimony, 4 parts; tin, 20 parts: mix. 3. Plate-brass, tin, bismuth, and antimony, of each equal parts. Add this mixture to melted tin until it acquires the proper color and hardness.

Bronze.—1. Copper, 83 parts; zinc, 11 parts; tin, 4 parts; lead, 2 parts; mix. 2. Copper, 14 parts; melt, and add zinc, 6 parts; tin, 4 parts; mix.

Ancient Bronze.—Copper, 100 parts; lead and tin, each, 7 parts: mix.

Alloy for Bronze Ornaments.—Copper, 82 parts; zinc, 18 parts; tin, 3 parts; lead, 3 parts; mix.

Beautiful Red Bronze Powder.—Sulphate of copper, 100 parts; carbonate of soda, 60 parts: apply heat until they unite into a mass;

then cool, and add copper filings, 15 parts. Well mix, and keep them at a white heat for 20 minutes; then cool, powder, wash, and dry.

Bronzing Fluid for Guns.—Nitric acid, sp. gr. 1. 2 parts; nitric ether, alcohol, muriate of iron, each 1 part: mix, then add sulphate of copper, 2 parts, dissolved in water, 10 parts.

Cannon Metal.—Take tin, 10 parts; copper, 90 parts: melt.

Statuary Bronze.—1. Copper, 88 parts; tin, 9 parts; zinc, 2 parts; lead, 1 part. 2. Copper, 82½ parts; tin, 5 parts; zinc, 10½ parts; lead, 2 parts. 3. Copper, 90 parts; tin, 9 parts; lead, 1 part.

Bronze, for Medals.—Copper, 89 parts; tin, 8 parts; zinc, 3 parts.

Brass, for Heavy Work.—Copper, 100 parts; tin, 15 parts. zinc, 15 parts. *Another*.—Copper, 112 parts; tin, 13; zinc, 1.

Brass, for Tubes.—Copper, 2 parts; zinc, 1 part.

Alloy, for Cymbals.—Copper, 80; tin, 20.

Mirrors of Reflecting Telescopes.—Copper, 100; tin, 50.

White Argentan.—Copper, 8 parts; nickel, 3 parts; zinc, 35 parts. This beautiful composition is in imitation of silver.

Chinese Silver.—Silver, 2.5; copper, 65.24; zinc, 19.52; cobalt of iron, 0.12; nickel, 13.

Tutenag.—Copper, 8; nickel, 3; zinc, 5.

Printing Characters.—1. Lead, 4; antimony, 2. 2. For stereotype plates, lead, 25 parts; antimony, 4 parts; tin, 1 part.

Fine White German Silver.—1. *For Castings.* Lead, 3 parts; nickel, 20 parts; zinc, 20 parts; copper, 60 parts: mix. 2. *For Rolling.* Nickel, 5 parts; zinc, 4 parts; copper, 12 parts: mix.

Imitation Platinum.—Melt together 8 parts brass and 5 parts of zinc. This alloy very closely resembles platinum.

Imitation Gold.—Platina, 8 parts; silver, 4 parts; copper, 12 parts: melt all together.

Imitation Silver.—Block-tin, 100 parts; antimony, 8 parts; bismuth, 1 part; copper, 4 parts: melt all together.

Tombac, or Red Brass.—Melt together 8 parts of copper and 1 part of zinc.

Parisian Bell-Metal.—Copper, 72 parts; tin, 26½ parts; iron, 1½ parts. Used for the bells of small ornamental clocks.

Bell-Metal.—1. Copper, 25 parts; tin, 5 parts: mix. 2. Copper, 79 parts; tin, 26 parts: mix. 3. Copper, 78 parts; tin, 22 parts: mix.

Prince's Metal.—1. Copper, 3 parts; zinc, 1 part. 2. Brass, 8 parts; zinc, 1 part. 3. Zinc and copper, equal parts: mix.

Queen's Metal.—1. Lead, 1 part; bismuth, 1 part; antimony, 1 part,; tin, 9 parts: mix. 2. Tin, 9 parts; bismuth, 1 part; lead, 2 parts; antimony, 1 part: mix by melting.

Brass.—Copper, 3 parts: melt, then add zinc, 1 part.

Button-Makers' Fine Brass.—Brass, 8 parts; zinc, 5 parts.

Button-Makers' Common Brass.—Button brass, 6 parts; tin, 1 part; lead, 1 part: mix.

Organ Pipes consist of lead alloyed with about half its quantity of tin to harden it. The mottled or crystalline appearance so much admired shows an abundance of tin.

BARON WETTERSTEDTS PATENT SHEATHING for ships consists of lead, with from 2 to 8 per cent of antimony; about 3 per cent. is the usual quantity. The alloy is rolled into sheets.

LEAD SHOT are cast by letting the metal run through a narrow slit into a species of colander at the top of a lofty tower; the metal escapes in drops, which, for the most part, assume the spherical form before they reach the tank of water into which they fall at the foot of the tower, and this prevents their being bruised. They are afterwards riddled or sifted for size, and afterwards churned in a barrel with black lead.

METAL FOR ANATOMICAL INJECTIONS.-Tin, 16.41 parts; lead, 9.27 parts; bismuth, 27.81 parts; mercury, 46.41 parts.

YELLOW DIPPING METAL.—Copper, 32 lbs.; 6 to 7 oz. zinc to every lb. of copper.

LEAD PIPES are now manufactured by hydraulic pressure, instead of by the old process of drawing out on triblets.

MUNTZ METAL FOR SHIPS.—Best selected copper, 60 parts; best zinc, 40 parts. Melt together in the usual manner, and roll into sheets of suitable thickness. This composition resists oxidation from exposure to sea-water, and prevents the adhesion of barnacles.

ACID BRONZE.—Cobalt, 4 lbs.; pulverize; sift through a fine sieve; put in a stone pot; add ½ gal. nitric acid, a little at a time, stirring frequently for 24 hours; then add about 5 gals. muriatic acid, or, until the work comes out a dark brown.

ALKALI BRONZE.—Dissolve 5 lbs. nitrate of copper in 3 gals. water, with 5 lbs. pearlash; add 1 or 2 pints potash water; then add from 2 to 3 lbs. sal-ammoniac, or, until the work comes out the required color.

COATING DIP.—Sulphate of zinc, 8 lbs.; oil of vitriol, 5 gals.; aqua fortis, ¾ gal. To use, warm up scalding hot.

TO CLEAN AND POLISH BRASS.—Wash with alum boiled in strong lye, in the proportion of an ounce to a pint; afterwards rub with strong tripoli. Not to be used on gilt or lacquered work.

ORMOLU COLORING.—Alum, 30 parts; nitrate of potassa, 30 parts; red ochre, 30 parts; sulphate of zinc, 8 parts; common salt, 1 part; sulphate of iron, 1 part. It is applied with a soft brush. The articles are placed over a clear charcoal fire until the salts, melted and dried, assume a brown aspect. They are then suddenly cooled in nitric acid water containing 3 per cent. of hydrochloric acid; afterwards washed in abundance of water and dried in sawdust.

QUICK BRIGHT DIPPING ACID, FOR BRASS WHICH HAS BEEN ORMOLUED.—Sulphuric Acid, 1 gal.; nitric acid, 1 gal.

DIPPING ACID.—Sulphuric acid, 12 lbs.; nitric acid, 1 pint; nitre, 4 lbs.; soot, 2 handfuls; brimstone, 2 oz. Pulverize the brimstone, and soak it in water an hour. Add the nitric acid last.

GOOD DIPPING ACID FOR CAST BRASS.—Sulphuric acid, 1 qt.; nitre, 1 qt.; water, 1 qt. A little muriatic acid may be added or omitted.

ORMOLU DIPPING ACID, FOR SHEET BRASS.—Sulphuric acid 2 gals.; nitric acid, 1 pt.; muriatic acid, 1 pt.; nitre 12 lbs. Put in the muriatic acid last, a little at a time, and stir the mixture with a stick.

Dipping Acid.—Sulphuric acid, 4 gals.; nitric acid, 2 gals; saturated solution of sulphate of iron (copperas), 1 pint; solution of sulphate of copper, 1 qt.

Ormolu Dipping Acid, for Sheet or Cast Brass.—Sulphuric acid, 1 gal.; sal ammoniac, 1 oz., sulphur (in flour), 1 oz.; blue vitriol, 1 oz.; saturated solution of zinc in nitric acid, mixed with an equal quantity of sulphuric acid, 1 gal.

To Prepare Brass Work for Ormolu Dipping.—If the work is oily, boil it in lye; and if it is finished work, filed or turned, dip it in old acid, and it is then ready to be ormolued; but if it is unfinished, and free from oil, pickle it in strong sulphuric acid, dip in pure nitric acid, and then in the old acid, after which it will be ready for ormoluing.

To Repair Old Nitric Acid Ormolu Dips.—If the work after dipping appears coarse and spotted, add vitriol till it answers the purpose. If the work after dipping appears too smooth, add muriatic acid and nitre till it gives the right appearance.

The other ormolu dips should be repaired according to the receipts, putting in the proper ingredients to strengthen them. They should not be allowed to settle, but should be stirred often while using.

Tinning Acid, for Brass or Zinc.—Muriatic acid, 1 qt.; zinc, 6 oz. To a solution of this, add water, 1 qt.; sal-ammoniac, 2 oz.

Vinegar Bronze, for Brass.—Vinegar, 10 gals.; blue vitriol, 3 lbs.; muriatic acid, 3 lbs.; corrosive sublimate, 4 grs.; sal-ammoniac, 2 lbs.; alum, 8 oz.

Directions for making Lacquer.—Mix the ingredients, and let the vessel containing them stand in the sun, or in a place slightly warmed, three or four days, shaking it frequently till the gum is dissolved, after which let it settle from twenty-four to forty-eight hours, when the clear liquor may be poured off for use. Pulverized glass is sometimes used, in making lacquer, to carry down the impurities.

Lacquer for Dipped Brass.—Alcohol, proof specific gravity not less than 95-100ths, 2 gals.; seed lac, 1 lb.; gum copal, 1 oz.; English saffron, 1 oz.; annotto, 1 oz.

Lacquer for Bronzed Brass.—To one pint of the above lacquer, add gamboge, 1 oz.; and, after mixing it, add an equal quantity of the first lacquer.

Deep Gold-colored Lacquer.—Best alcohol, 40 oz.; Spanish annotto, 8 grs.; turmeric, 2 drs.; shellac, ½ oz.; red sanders, 12 grs.; when dissolved, add spirits of turpentine, 30 drops.

Deep Gold-colored Lacquer for Brass not Dipped.—Alcohol, 4 gals.; turmeric, 3 lbs.; gamboge, 3 oz.; gum sanderach, 7 lbs.; shellac, 1½ lbs.; turpentine varnish, 1 pint.

Gold-colored Lacquer, for Dipped Brass.—Alcohol, 36 oz.; seed lac, 6 oz.; amber, 2 oz.; gum gutta, 2 oz,; red sandal wood, 24 grs.; dragon's blood, 60 grs.; oriental saffron, 36 grs.; pulverized glass, 4 oz.

Gold Lacquer, for Brass.—Seed lac, 6 oz.; amber or copal, 2 oz.; best alcohol, 4 gals.; pulverized glass, 4 oz.; dragon's blood, 40 grs.; extract of red sandal wood obtained by water, 30 grs.

Lacquer for Dipped Brass.—Alcohol, 12 gals.; seed lac, 8 lbs.; turmeric, 1 lb. to a gallon of the above mixture; Spanish saffron, 4 oz. The saffron is to be added for bronze work.

Good Lacquer.—Alcohol, 8 oz.; gamboge, 1 oz.; shellac, 3 oz.; annotto, 1 oz.; solution of 3 oz. of seed lac in 1 pint of alcohol; when dissolved, add ½ oz. Venice turpentine, ¼ oz. dragon's blood, will make it dark; keep it in a warm place four or five days.

To Bronze Iron Castings.—Cleanse thoroughly, and afterwards immerse in a solution of sulphate of copper, when the castings will acquire a coat of the latter metal. They must be then washed in water.

Antique Bronze Paint.—Sal-ammoniac, 1 oz.; cream tartar, 3 oz.; common salt, 6 oz. Dissolve in 1 pint hot water, then add 2 oz. of nitrate of copper dissolved in ½ pint water, mix well, and apply it repeatedly to the article, in a damp situation, with a brush.

Gilders Pickle.—Alum and common salt, each, 1 oz.; nitre, 2 oz.; dissolved in water, ½ pt. Used to impart a rich yellow color to gold surfaces. It is best used largely diluted with water.

To Silver Ivory.—Pound a small piece of nitrate of silver in a mortar, add soft water to it, mix them well together, and keep in vial for use. When you wish to silver any article, immerse it in this solution, let it remain till it turns of a deep yellow; then place it in clear water, and expose it to the rays of the sun. If you wish to depicture a figure, name, or cipher, on your ivory, dip a camel's-hair pencil in the solution, and draw the subject on the ivory. After it has turned a deep yellow, wash it well with water, and place it in the sunshine, occasionally wetting it with pure water. In a short time it will turn of a deep black color, which, if well rubbed, will change to a brilliant silver.

Pale Lacquer for Tin Plate.—Best alcohol, 8 oz.; turmeric, 4 drs.; hay saffron, 2 scs.; dragon blood, 4 scs.; red sanders, 1 sc.; shellac, 1 oz.; gum sanderach, 2 drs.; gum mastic, 2 drs.; Canada balsam, 2 drs.; when dissolved, add spirits of turpentine, 80 drops.

Red Lacquer for Brass.—Alcohol, 8 gals.; dragon's blood, 4 lbs.; Spanish annotto, 12 lbs.; gum sanderach, 13 lbs.; turpentine, 1 gal.

Pale Lacquer, for Brass.—Alcohol, 2 gals.; Cape aloes, cut small, 3 oz.; pale shellac, 1 lb.; gamboge, 1 oz.

Blue Bronze on Copper.—Clean and polish well, then cover the surface with a fluid obtained by dissolving vermilion in a warm solution of sulphide of sodium, to which some caustic potassa has been added.

Application of Bronze Powders.—The proper way is to varnish the article and then dust the bronze powder over it, after the varnish is partially dried.

Bronze Dip.—Sal-ammoniac, 1 oz.; salt of sorrel (binoxolate of potash), ¼ oz. dissolved in vinegar.

Parisian Bronze Dip.—Sal-ammoniac, ½ oz.; common salt, ½ oz.; spirits of hartshorn, 1 oz. dissolved in an English quart of vinegar. A good result will be obtained by adding ½ oz. of sal-ammoniac, instead of the spirits of hartshorn. The piece of metal being well cleaned is to be rubbed with one of these solutions, then dried by friction with a fresh brush.

BEST LACQUER, FOR BRASS.—Alcohol, 4 gals.; shellac, 2 lbs.; amber gum, 1 lb.; copal, 20 oz.; seed lac, 3 lbs.; saffron, to color; pulverized glass, 8 oz.

COLOR FOR LACQUER.—Alcohol, 1 qt.; annotto, 4 oz.

GREEN BRONZE DIP.—Wine vinegar, 2 qts.; verditer green, 2 oz.; sal-ammoniac, 1 oz., salt, 2 oz.; alum, ½ oz.; French berries, 8 oz.; boil the ingredients together.

AQUA FORTIS BRONZE DIP.—Nitric acid, 8 oz.; muriatic acid, 1 qt.; sal-ammoniac, 2 oz.; alum, 1 oz.; salt, 2 oz.

OLIVE BRONZE DIP, FOR BRASS.—Nitric acid, 3 oz.; muriatic acid, 2 oz.; add titanium or palladium, when the metal is dissolved, add 2 gals. pure soft water to each pint of the solution.

BROWN BRONZE PAINT, FOR COPPER VESSELS.—Tincture of steel, 4 oz.; spirits of nitre, 4 oz.; essence of dendi, 4 oz.; blue vitriol, 1 oz.; water, ½ pint. Mix in a bottle; apply it with a fine brush, the vessel being full of boiling water; varnish after the application of the bronze.

BRONZE FOR ALL KINDS OF METAL.—Muriate of ammonia (sal-ammoniac), 4 drs.; oxalic acid, 1 dr.; vinegar, 1 pint. Dissolve the oxalic acid first; let the work be clean; put on the bronze with a brush, repeating the operation as many times as may be necessary.

BRONZE PAINT, FOR IRON OR BRASS.—Chrome green, 2 lbs.; ivory black, 1 oz.; chrome yellow, 1 oz.; good japan, 1 gill; grind all together, and mix with linseed oil.

GREEN BRONZE.—Dissolve 2 oz. nitrate of iron, and 2 oz. hyposulphite of soda, in 1 pt. water. Immerse the article until the required shade is obtained, as almost any shade from brown to red can be obtained, according to the time of immersion, then well wash with water, dry and brush.

PALE DEEP OLIVE GREEN BRONZE.—Perchloride of iron, 1 part; water, 2 parts; mix, and immerse the brass.

DARK GREEN.—Saturate nitric acid with copper, and immerse the brass.

DEAD BLACK ON BRASSWORK.—Rub the surface first with tripoli; then wash it with a solution of 1 part neutral nitrate of tin, with 2 parts chloride of gold; after 10 minutes wipe it off with a wet cloth.

REMOVING ZINC AND IRON FROM PLUMBERS' SOLDER.—Digest the metal in grains in diluted sulphuric acid. The acid will dissolve the zinc first, the iron next, and all traces of these metals by subsequent washing.

TINNING CAST IRON.—Pickle your castings in oil of vitriol; then cover or immerse them in muriate of zinc (made by putting a sufficient quantity of zinc in some spirit of salt): after which dip it in a melted bath of tin or solder.

SILVERING BY HEAT.—Dissolve 1 oz. silver in nitric acid; add a small quantity of salt; then wash it and add sal-ammoniac, or 6 oz. of salt and white vitriol; also ¼ oz. corrosive sublimate; rub them together till they form a paste; rub the piece which is to be silvered with the paste; heat it till the silver runs; after which dip it in a weak vitriol pickle to clean it.

TO TIN COPPER AND BRASS.—Boil 6 lbs. cream of tartar and 4 gals. of water and 8 lbs of grain tin or tin shavings. After the material has boiled a sufficient time, the articles to be tinned are put therein and the boiling continued, when the tin is precipitated on the goods in metallic form.

MIXTURE FOR SILVERING.—Dissolve 2 oz. of silver with 3 grs. of corrosive sublimate ; add tartaric acid, 4 lbs. ; salt, 8 qts.

TO SEPARATE SILVER FROM COPPER.—Mix sulphuric acid, 1 part; nitric acid, 1 part ; water, 1 part ; boil the metal in the mixture till it is dissolved, throw in a little salt to cause the silver to subside.

TO WRITE IN SILVER.—Mix 1 oz. of the finest pewter or block tin, and 2 oz. of quicksilver together till both become fluid, then grind it with gum water, and write with it. The writing will then look as if done with silver.

BEST BRONZE FOR BRASS.—Take 1 lb. muriatic acid, and ½ lb. white arsenic. Put them into an earthen vessel, and then proceed in the usual manner.

ANOTHER BRONZE FOR BRASS.—One ounce muriate of ammonia, ½ oz. alum, ¼ oz. arsenic, dissolved altogether in 1 pt. of strong vinegar.

ZINCING.—Copper and brass vessels may be covered with a firmly adherent layer of pure zinc by boiling them in contact with a solution of chloride of zinc, pure zinc turnings being at the same time present in considerable excess.

CLOUDING METAL WORK.—Metal work may be clouded by putting a piece of fine emery paper under the thumb or finger, and working it over the surface of the metal with a spiral motion.

CEMENT FOR BELTING. *Waterproof.*—Dissolve gutta percha in bisulphide of carbon to the consistence of molasses, slice down and thin the ends to be united, warm the parts, and apply the cement, then hammer lightly on a smooth anvil, or submit the parts to heavy pressure.

TO PREVENT INCRUSTATION IN BOILERS.—1. Charcoal has a great affinity for any thing that causes scale or incrustation in boilers. That made from hard wood is the best, broken in lumps of ¼ to ½ inch in size, and the dust sifted out. Two bushels of this will generally protect a boiler of 30 horse power for 3 weeks, when running, after which the old coal should be removed and fresh coal used. 2. Throw into the tank or reservoir from which your boiler is fed, a quantity of rough bark, in the piece, such as tanners use, sufficient to turn the water of a brown color ; if you have no tank, put into the boiler from a half to a bushel of ground bark when you blow off, repeat every month, using only half the quantity after the first time. 3. Add a very small quantity of muriate of ammonia, about 1 lb. for every 1,500 or 2,000 gals. of water evaporated. It will have the effect of softening and disintegrating the carbonate of lime and other impurities deposited by the water during evaporation. 4. Potatoes and some other vegetable substances introduced into the boiler are most effectual in preventing incrustation, and animal substances such as refuse skins, are still more so. 5. An English firm put oak sawdust into their boiler in order to stop a leak, and to their surprise it also resulted in preventing incrustation. I should say if oak sawdust could prevent scale in boilers, that there is no visible reason why hemlock and various other kinds of sawdust will not do the same thing. 6. Cows feet with the shanks attached are strongly recommended as a preventative of scale. Two in a large boiler is amply sufficient, and those who wish to do business economically, can get their oil for lubricating purposes cheaply by boiling the feet and shanks for a few hours in a large kettle, setting it aside to cool and then skimming off the oil from the surface of the water, using the feet for the boiler afterwards. If you wish to get rid of the hair on the shanks, you can get rid of that by using lime, &c., as done by tanners.

Management of the Steam Engine.—Steam Packing.—To pack the cylinder or piston, plait some packing yarn sufficiently tight that it will need driving; if cotton rope is convenient, put in a coil first, driving it to fit tight; then fill the remainder of the chamber of the piston with the plaited yarn, driving it tight and full, leaving room for the nuts to go on the bolts; screw the nuts evenly and alike until they are fast. The packing should be well soaked in bees wax and tallow before using it. A new kind of packing has been brought out lately, consisting of a mixture of duck, paper and tallow mixed in proper proportions. Metallic vulcanized rubber packing is strongly recommended as the best packing. This is so prepared that 300° Fahrenheit will not affect it. No other substance has so much elasticity which stands so high a degree of heat, or which may be used about all parts of the machinery, as this packing, where packing is necessary, namely: cylinder heads, man hole plates, piston rods, steam chests, steam joints, stuffing boxes, &c. The journals of the crank and the T head require close watching; if they are loose in the boxes, or too tight, they will run badly: thus, if tightened too much, they will heat and wear out the brass runners, if they are not sufficiently tight, there is danger of the keys flying out and breaking the engine. All the valves belonging to the engine should be ground in with emery, to keep them from losing either steam or water. Care should be taken of them as they will wear. When you find them leak, they should be ground over again. If suffered to remain long when leaking steam, there may be new ones required.

The boilers require to be often cleaned out, and care should be taken to remove the scales and mud from adhering to the inside, otherwise, if the scales are suffered to remain, the boiler will burn and want repairing. It is necessary to try the gauge-cock often, to see if there is sufficient water in the boilers. There is great danger in running after the water is below the lowermost gauge-cock, and the flues should be kept cleanly swept.

To Mend Broken Saws.—Pure silver, 19 parts; pure copper, 1 part; pure brass, 2 parts; all to be filed into powder, and thoroughly mixed; place the saw level on the anvil, broken edges in contact, and hold them so; now put a small line of the mixture along the seam, covering it with a larger bulk of powdered charcoal; now with a spirit lamp and a jewellers' blow-pipe, hold the coal dust in place, and blow sufficient to melt the solder mixture; then with a hammer set the joint smooth, and file away any superfluous solder, and you will be surprised at its strength; the heat will not injure the temper of the saw.

WRITING INSCRIPTIONS ON METALS.—Take ½ lb. of nitric acid and 1 oz. of muriatic acid. Mix. shake well together, and it is ready for use. Cover the place you wish to mark with melted bees-wax; when cold, write your inscription plainly in the wax clear to the metal with a sharp instrument; then apply the mixed acids with a feather, carefully filling each letter. Let it remain from 1 to 10 minutes, according to appearance desired; then throw on water, which stops the process, and remove the wax.

ETCHING FLUIDS.—*For copper.* Aquafortis, 2 oz.; water, 5 oz. *For steel.* Iodine, 1 oz.; iron filings, ½ dr.; water, 4 oz. Digest till the iron is dissolved. *For fine touches.* Dissolve 4 parts each of verdigris, sea salt, and sal-ammoniac, in 8 parts vinegar, add 16 parts water; boil for a minute, and let it cool.

ENGRAVERS' BORDER WAX.—Bees wax, 1 part; pitch, 2 parts; tallow, 1 part. Mix. *Engravers' cement.* Rosin, 1 part; brick dust, 1 part. Mix with heat.

JAPANNERS' GOLD SIZE.—Gum ammoniac, 1 lb.; boiled oil, 8 oz.; spirits turpentine, 12 oz. Melt the gum, then add the oil, and lastly spirits turpentine.

BLACK VARNISH FOR IRON WORK.—Asphaltum, 1 lb.; lampblack, ¼ lb.; resin ½ lb.; spirits turpentine, 1 quart; linseed oil, just sufficient to rub up the lampblack with before mixing it with the others. Apply with a camel's hair brush.

TO PETRIFY WOOD.—Gem salt, rock alum, white vinegar, chalk and pebbles powder, of each an equal quantity. Mix well together. If, after the ebullition is over, you throw into this liquid any wood or porous substance, it will petrify it.

THE FINEST BRONZE.—Put in a clean crucible 7 lbs. copper, melt, then add 3 lbs. zinc, afterward 2 lbs tin.

GEARING A LATHE FOR SCREW CUTTING.—Every screw cutting lathe contains a long screw called the lead screw, which feeds the carriage of the lathe, while cutting screws; upon the end of this screw is placed a gear, to which is transmitted motion from another gear placed on the end of the spindle, these gears each contain a different number of teeth, for the purpose of cutting different threads, and the threads are cut a certain number to the inch varying from 1 to 50. Therefore to find the proper gears to cut a certain number of threads to the inch, you will first:—multiply the number of threads you desire to cut to the inch, by any small number, four for instance, and this will give you the proper gear to put on the lead screw. Then with the same number, four, multiply the number of threads to the inch in the lead screw, and this will give you the proper gear to put on the spindle. For example, if you want to cut 12 to the inch, multiply 12 by 4, and it will give you 48. Put this gear on the lead screw, then with the same number, 4, multiply the number of threads to the inch in the lead screw. If it is five for instance, it will give you twenty, put this on the spindle and your lathe is geared. If the lead screw is 4, 5, 6, 7, or 8, the same rule holds good. Always multiply the number of threads to be cut, first. Some, indeed most small lathes, are now made with a stud geared into the spindle, which stud only runs half as fast as the spindle, and in finding the gears for these lathes, you will first multiply the number of threads to be cut, as before, and then multiply the number of threads on the lead screw, as double the number it is. For instance if you want to cut 10 to the inch, multiply by 4, and you get 40, put this on the lead screw, then if your lead screw is five to the inch, you call it 10; and multiply by 4 and it will give you 40. Again put this on your stud and your lathe is geared ready to commence cutting.

Cutting a Screw in an Engine Lathe.—In cutting V thread-screw, it is only necessary for you to practice operating the shipper and slide-screw handle of your lathe, before cutting. After having done this, until you get the motions, you may set the point of the tool as high as the centre, and if you keep the tool sharp, you will find no difficulty in cutting screws. You must, however, cut very light chips, mere scrapings in finishing and must take it out of the lathe often, and look at it from both sides, very carefully, to see that the threads do not lean like fish scales. After cutting, polish with an emery stick, and some emery.

Cutting Square Thread Screws.—In cutting square thread-screws, it is always necessary to get the depth required, with a tool somewhat thinner than one-half the pitch of the thread. After doing this, make another tool exactly one-half the pitch of the thread, and use it to finish with, cutting a light chip on each side of the groove. After doing this, polish with a pine stick, and some emery. Square threads for strength should be cut one-half the depth of their pitch, while square threads, for wear, may, and should be cut three-fourths the depth of their pitch.

Mongrel Threads.—Mongrel, or half V, half-square threads are usually made for great wear, and should be cut the depth of their pitch, and for extraordinary wear they may even be cut 1¼ the depth of their pitch. The point and the bottom of the grooves should be in width ¼ the depth of their pitch. What is meant here by the point of the thread, is the outside surface. And the bottom of the groove is the groove between the threads. In cutting these threads it is necessary to use a tool about the shape of the thread, and in thickness about one-fifth less than the thread is when finished. As it is impossible to cut the whole surface at once, you will cut it in depth about one-sixteenth at a time, then a chip off the sides of the thread and continue in this way alternately till you have arrived at the depth required. Make a gauge of the size required between the threads and finish by scraping with water. It is usually best to leave such screws as these a little large until after they are cut, and then turn off a light chip, to size them, this leaves them true and nice.

Planing Metals.—The first operation about planing, is to oil your planer and find out if the bed is smooth. If it is not, file off the rough places; then change the dogs to see if they will work well, and find out the movements of the planer. After doing this, bolt your work on to the bed, and if it is a long, thin piece, plane off a chip, then turn it over and finish the other side, taking two chips, the last of which should be very light. Great care should be taken, in bolting it to the bed, not to spring it. After finishing this side turn it to the other side, and take off a light cut to finish it.

Planing Perpendicularly.—In planing perpendicularly, it is necessary to swivel the bottom of the small head around, so it will stand about three-fourths of an inch inside of square, towards the piece you are to plane. This prevents breaking the tool when the bed runs back.

Gear Cutting.—In cutting gears, they are reckoned a certain number of teeth to the inch, measuring across the diameter to a certain line which is marked on the face or sides of the gear with a tool. This line is one-half the depth of the teeth from the outer diameter. That is, if the teeth of the gear are two-tenths of an inch deep, this line would be one-tenth of an inch from the edge and is called the pitch line.

Depth of Teeth.—Every gear cut with a different number of teeth to the inch, should be cut of a depth to the pitch line, to correspond with the number of teeth to the inch. This is called proportion. Therefore, if you cut a gear eight to the inch, the depth to the pitch line should be one-eighth of an inch, and the whole depth of the tooth would be two-eighths. Again, if you cut a gear twelve to the inch, the depth to pitch line should be one-twelfth of an inch, and the whole depth of tooth two twelfths. And again, if you cut a gear twenty to the inch, the depth to pitch line should be one-twentieth of an inch, while the whole depth should be two-twentieths, and so on *ad infinitum.*

Measuring to find the Number of Teeth.—To find the size a certain gear should be, for a certain number of teeth, is an easy matter, if you study carefully these rules. If you want a gear with thirty-two teeth and eight to the inch, it should be four inches measuring across the diameter to the pitch line, and the two-eighths outside of the pitch line would make it four inches and two-eighths. Again, if you want a gear with forty teeth, and ten to the inch, it should measure across the diameter to pitch line four inches, and the two-tenths outside the pitch line would make the whole diameter four inches and two-tenths. And again, if you want a gear with eighty teeth, and twenty to the inch, it should measure to the pitch line, across the diameter, four inches, and the two-twentieths outside the pitch line would make it four inches and two-twentieths, and these examples will form a rule for the measurement of all except bevel gears.

Bevel Gears.—These are turned a certain bevel to correspond with each other, according to the angle upon which the shafts driven by them are set. For instance, if two shafts are set upon an angle of ninety degrees, the surfaces of the faces of these gears will stand at an angle of forty-five degrees. To get the surface of these gears, in turning them, puts a straight edge across the face. Then set your level on an angle of forty-five degrees, and try the face of the teeth by placing the level on the straight edge. After turning the face of the teeth, square the outer diameter by the face of the teeth; and to get the size to which you wish to cut, measure from the centre of the face of the teeth. Thus, if a bevel gear is six inches in diameter, and the face of the teeth is one inch, you will measure from the centre of the face, and find it is five inches. On this line you calculate the number of teeth to the inch, and if you want a gear with twenty teeth, and ten to the inch, it should

re two inches across the face to the centre of the surface of
th; and if the face of the teeth were one inch in length, the
ter of the gear would be three inches, and the inside of the
vould measure only one inch. Again, if you want to cut a
vith forty teeth, and ten to the inch, it would measure four
to the centre of the teeth on the surface. And if the surface
teeth were one inch long, the diameter of the gear would be
ches, while it would only measure three inches inside the
These examples will form a rule for all bevel gears.

w-Filing and Finishing.—To draw-file a piece of work
ly and quickly, it is best to first draw-file it with a medium
e, and finish with a superfine file. After doing this, polish
rk with dry emery paper and then with emery paper and

ng Boxes with Babbitt Metal.—To line boxes properly,
o insure their filling every time, it is necessary to heat the
arly red hot, or at least hot enough to melt the metal. Then
the shaft where the metal is to be poured upon it. This
its coming out of the box easily, after it is cold. After
g the shaft, put it into the box or boxes, and draw some
round the ends of them, for the purpose of stopping them,
care not to press upon it, for if you do it will go into the
d fill a place that ought to be filled with metal; and in the
me your metal ought to be heated, and after you have
it, let the box stand till it is nearly cold; drive out your
nd it is done.

ting Machines Together.—In putting machines together no
ould be finished except where it is necessary to make a fit,
sometimes the case that machinery is miscalculated, and by
g it would be spoiled, while if it were not, it might be saved
ht alterations in design. And again, in finishing certain
before you get a machine together, you are unknowingly
g parts not necessary to be finished, and making them of a
anything but desirable. This rule, however, is not intended
y to machinery being made to detail drawings.

Drill a Hole where you have no Reamer.—It is some-
necessary to drill a hole of an exact size to fit a certain shaft,
the same time have it smooth without reaming it. This
e done, by first drilling a hole, one-hundredth of an inch
r than the size desired, and then making a drill the exact
d running it through to finish with. This last drill should
he corners of its lips rounded, like a reamer, and the hole
be finished without holding the drill with a rest.

ring, or facing up Cast Iron Surfaces.—A round-end,
best for this. A rough chip should first be taken off, over
tire surface to be faced. Then speed your lathe up and
a light chip, merely enough to take out the first tool marks,
er the entire surface again. In turning up surfaces it is
best to begin at the centre and feed out, as the tool cuts
nd will wear twice as long.

ng a Hole with a Boring Tool.—In boring a hole with a
tool, it is usually necessary to drill the hole first, and too
care cannot be taken in finishing. An iron gauge should be

made first; it is usually made of a piece of sheet iron or wire. The hole should then be drilled smaller than the size desired, and then bored to the required size, and it is impossible to bore a hole perfect without taking two or three light chips, mere scrapings with which to finish. Holes, in this way, may be bored as nicely as they can be reamed.

Boring Holes with Boring Arbor.—A boring arbor is a shaft with a steel set in it, for the purpose of boring holes of great length, and is designed to be used in a lathe. In doing this properly, you must first see if your lathe is set straight; if not, adjust it. Having done this, put the piece of work to be bored in the carriage of your lathe, pass your arbor through the hole to be bored, and put it on the centres of your lathe. Having done this, adjust your work true to the position desired by measuring from the point of the tool, continually turning round the arbor from side to side of the piece to be bored, while you are bolting it to the carriage, and measure until it is perfectly true. Having done this, bore the hole, and take for the last chip only a hundredth of in inch. This makes a true and smooth hole. It is impossible to make a hole true with any kind of a tool when you are cutting a large chip, for the tool springs so that no dependence can be placed upon it.

To Make a Boring Arbor and Tool that will not Chatter.—Boring tools, when used in small arbors, are always liable to chatter and make a rough hole. To prevent this, the tool should be turned in a lathe, while in its position in the arbor, upon the circle of the size of the hole to be bored, and the bearing lengthwise of the arbor, should be only as wide as the feed of the lathe; for if the bearing of a tool is on the face, the more it will chatter.

To Reduce Metallic Oxides.—This may be effected by the dry and the moist processes; but the deoxidizing agent of the greatest value to the metallurgist is coal in its several varieties, and the derivative materials yielded by its combustion. When coal is burned in a furnace, the product of combustion may be considered to be carbonic acid gas; but inasmuch as the latter is readily decomposed by permeating ignited pieces of solid carbon (coke), losing a portion of its oxygen, and becoming carbonic acid gas, we may say that the products of the combustion of coal are, firstly, carbonic acid; secondly, carbonic oxide and carbonic acid; and lastly, carbonic oxide alone. The latter, in combination with heat, is a most powerful deoxidizing agent. Were it not for the production in furnaces of carbonic oxide gas—were it necessary that the solid carbon of the coke should be alone the deoxidizing body—then it follows that every particle of the ore to be reduced must be brought into intimate contact with the reducing body: a process involving more care and trouble than are compatible with large metallurgic operations. The reducing agent being a gas, there is no longer a necessity for that intimate mixture of fuel and ore which would otherwise be necessary. Provided that the gaseous results of combustion are placed under circumstances of readily permeating the ore, the necessities of practice are amply subserved. There is great difference as to the amount of heat at which the reduction of different metallic oxides can be effected. The oxides of lead, bismuth, antimony, nickel, cobalt, copper, and iron require a strong red heat in the furnace, whilst the oxides of manganese, chromium, tin, and zinc, do not lose their oxygen until heated to whiteness.

On a large scale, the reduction of oxides is generally effected by mixing charcoal, together with the oxide to be reduced, in a refractory clay crucible, the charcoal furnishing the carbon necessary to the proper performance of this work. Some use a crucible thickly lined with charcoal, putting in the oxide on the top of the charcoal. It is necessary, however, when using the crucible and charcoal, to use a flux, say a little borax in powder, strewed on the mixture to accelerate the reduction of the oxide. The borax is generally the first to fuse, and, as the metal is eliminated, seems to purify and cleanse it, as it gathers into a button at the bottom of the crucible. It is all the better if you give the crucible a few sharp taps when you take it off the fire.

Copper Plates or Rods may be covered with a superficial coating of brass by exposing to the *fumes* given off by melted zinc at a light temperature. The coated plates or rods can then be rolled into thin sheets, or drawn into wire.

Solution of Copper or Zinc.—Dissolve 8 oz. (troy) cyanide of potassium, and 3 oz. cyanide of copper or zinc, in 1 gal. of rain water. To be used at about 160° F., with a compound battery of 3 to 12 cells.

Brass Solution.—Dissolve 1 lb. (troy) cyanide of potassium, 2 oz. cyanide of copper, and 1 oz. cyanide of zinc, in 1 gal. of rain-water; then add 2 oz. of muriate of ammonia. To be used at 160° F., for smooth work, with a compound battery of from 3 to 12 cells.

Brassing Iron.—Iron ornaments are covered with copper or brass, by properly preparing the surface so as to remove all organic matter which would prevent adhesion, and then plunging them into melted brass. A thin coating is thus spread over the iron, and it admits of being polished or burnished.

To Enamel Cast Iron and Hollow Ware.—1. Calcined flints, 6 parts; Cornish stone or *composition*, two parts; litharge, 9 parts; borax, 6 parts; argillaceous earth, 1 part; nitre, 1 part; calx of tin, 6 parts; purified potash, 1 part. 2. Calcined flints, 8 parts; red lead, 8 parts; borax, 6 parts; calx of tin, 5 parts; nitre, 1 part. 3. Potters' composition, 12 parts; borax, 8 parts; white lead, 10 parts; nitre, 2 parts; white marble, calcined, 1 part; purified potash, 2 parts; calx of tin, 5 parts. 4. Calcined flints, 4 parts; potters' composition, 1 part; nitre, 2 parts; borax, 8 parts; white marble, calcined, 1 part; argillaceous earth, ½ part; calx of tin, 2 parts. Whichever of the above compositions is taken must be finely powdered, mixed, and fused. The vitreous mass is to be ground when cold, sifted, and levigated with water; it is then made into a pap with water, or gum water. The pap is smeared or brushed over the interior of the vessel, dried, and fused with a proper heat in a muffle. Clean the vessels perfectly before applying.

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Enamelled Cast Iron.—Clean and brighten the iron before applying. The enamel consists of two coats—the body and the glaze. The body is made by fusing 100 lbs. ground flints, 75 lbs. of borax, and grinding 40 lbs. of this frit with 5 lbs. of potters' clay, in water, till it is brought to the consistence of a pap. A coat of this being applied and dried, but not hard, the glaze-powder is sifted over it. This consists of 100 lbs. Cornish stone in fine powder, 117 lbs. of borax, 35 lbs. of soda ash, 35 lbs. of nitre, 35 lbs. of sifted slaked lime, 13 lbs. of white sand, and 50 pounds of pounded white glass. These are all fused together; the frit obtained is pulverized. Of this powder, 45 lbs. are mixed with 1 lb. of soda ash, in hot water, and, the mixture being dried in a stove, is the glaze powder. After sifting this over the body-coat, the cast-iron article is put into a stove, kept at a temperature of about 212°, to dry it hard, after which it is set in a muffle-kiln, to fuse it into a glaze. The inside of pipes is enamelled (after being cleaned) by pouring the above body composition through them while the pipe is being turned around to insure an equal coating; after the body has become set, the glaze pap is poured in in like manner. The pipe is finally fired in the kiln.

To Enamel Copper and Other Vessels.—Flint glass, 6 parts; borax, 3 parts; red lead, 1 part; oxide of tin, 1 part. Mix all together, frit, grind into powder, make into a thin paste with water, apply with a brush to the surface of the vessels, after scaling by heat and cleaning them, repeat with a second or even a third coat, afterwards dry, and lastly fuse on by heat of an enamelled kiln.

Emery Wheels for Polishing.—Coarse emery powder is mixed with about half its weight of pulverized Stourbridge loam, and a little water or other liquid to make a thick paste; this is pressed into a metallic mould by means of a screw-press, and, after being thoroughly dried, is baked or burned in a muffle at a temperature above a red, and below a white heat. This forms an artificial emery stone, which cuts very greedily, with very little wear to itself. Unequalled for grinding and polishing glass, metals, enamels, stones, &c.

Holes in Millstones are filled with melted alum, mixing burr sand with it. If the hole is large, put some pieces of burr mill stones in it first, and pour in melted alum. These pieces of block should be cut exactly to fit. There should be small joints, and fastened with plaster of Paris. These holes should be cut at least 4 inches deep; there is then no danger of their getting loose.

Fitting a New Back on an Old Millstone.—Block your stone up with a block of wood, having its face down until it lies even, solid, and perfectly level; then pick and scrape off all the old plaster down to the face blocks, so that none remains but what is in the joints of the face blocks; then wash these blocks, and keep them soaked with water. Keep a number of pieces of burr blocks, at the same time, soaked with water. Take a pail half filled with clean water, and mixed with 2 tablespoonfuls of glue water, boiled and dissolved; mix in with your hand plaster of Paris until it be thick enough that it will not run; and, breaking all the lumps, pour this on the stone, rubbing it in with your hand; the stone being at the same time damped; and place small pieces of stone all over the joints of the face blocks; you then, with more plaster, mixed in the same way but more stiff, with this and pieces of burr stones, build walls round the eye and verge 4 or 5 inches high leaving the surface uneven and the eye larger, as it will be brought to its proper size by the last operation. It is better to build up the wall of the running stone round the verge for 3 inches without any spalls, so that the holes may be cut in to balance it. If you wish to make your stone heavier, you will take small pieces of iron, perfectly clean and free from grease, and lay them evenly all around the stone in the hollow place between the two walls just built; and, with plaster mixed a little thicker than milk, pour in under and through all the crevices in the iron until the surface is nearly level with the two walls. If the stones do not require additional weight added, instead of iron, use pieces of stone the same way, leaving the surface rough and uneven. Again, as before, build walls round the verge of the stone, and round the eye of the stone, until they are within 2 inches of the thickness you want your stones to be, the wall round the eye being 2 inches higher than that round the verge, and filling the space between the walls with stones; and, pouring in plaster again, make it nearly level with the walls, but leaving the surface rough and jagged, to make the next plaster adhere well to it. Let it stand until the back is dry and perfectly set, when you raise the stone upon its edge, and, with a trowel, plaster round the edge of the stone neatly, giving it a taper of half an inch from the face to the back of the stone. When cased round in this way, lay the stone down on the cock-head; it being in the balance ryne, but the driver off, then raise the spindle, and balance the stone as already directed before putting on the remainder of the back. Then have a tin made the size of the eye, and to reach from the balance ryne to the thickness you want the stone to be at the eye. This tin should be exactly fitted to its place, and made fast; then fit a hoop of wood or iron round the verge, having the upper edge of the thickness from the face you want the stone to be at the verge, and equal all round. This hoop should be greased; and, all the cracks round it, and the tin in the eye, being stopped, you pour thin plaster (with more glue water than in previous operations, to prevent it from setting so quickly, and to give time to finish off the back correctly) until it be level with the hoop round the verge, and with a straight edge, one end resting on the hoop, and the other end resting on the tin at the eye; then, by moving it round, and working the plaster with a trowel, make the surface of the back even and smooth between these two points. The hoop is then taken off, and the back and edges planed smooth; then lower the spindle until your runner lies solid, and put your band or hoop on, it being first made nearly red hot, and taking care that it is of sufficient size not to require too much driving; if fitting too tightly, it may loosen the back in driving it to its proper place; it may be cooled gently by pouring water on it; and, when cool, it should fit tight.

BALANCING A MILLSTONE.—First, take off the driver, that the stone may have full play on the cock-head; then raise the spindle so that there may be room between the stones to see the balance. Find the heaviest parts, and near the verge lay on sufficient weight to balance it. Cut a hole in the back of the stone, as deep as you can make it and as near the verge as possible that the binding iron hoop of the stone may keep the lead in its place. This hole should be wider at the bottom than the top in order to retain the lead when the stone is in motion, and into this the melted lead should be poured until it brings the stone completely into balance. When the lead is cold, cover over with mixed plaster, even with the back of the stone.

COMPOSITION TO KEEP MILLSTONES CLEAN.—Hot-water, 1 gal.; borax, 2 oz.; washing soda, ¼ lb. and 3 balls of the size of a hazel nut each of sal prunel. Mix and apply it to the burrs with a scrubbing brush. When grinding garlic wheat it is not necessary to take up the burrs at all. It is sufficient to drop through the eye of the burr twice per day one of the above described balls of sal prunel and that will keep the burrs sharp and clean, enabling the miller at all seasons to use the No. 13 bolt, to make finer flour and in greater quantity than usual.

TO VULCANIZE INDIA RUBBER.—The vulcanizing process patented by the late Charles Goodyear consists in incorporating with the rubber from 3 to 10 per cent of sulphur, together with various metallic oxides, chiefly lead and zinc, the quantity of the latter articles being regulated by the degree of elasticity &c., required in the desired article. The goods of one large establishment are vulcanized in cylindrical wrought iron steam heaters, over 50 feet long and from 5 to 6 feet in diameter. These heaters have doors opening on hinges at one end, and through these doors the goods to be vulcanized are introduced on a sort of railway carriage, then, after the door is shut, steam is let on, and a temperature of from 250° to 300° of heat is kept up for several hours, the degree of heat being ascertained by means of thermometers attached to the heaters. The value, solidity, and quality of the goods is much increased by keeping the articles under the pressure of metallic moulds or sheets while undergoing this process. The whole process requires careful manipulation and great experience to conduct it properly.

TO DEODORIZE RUBBER.—Cover the articles of rubber with charcoal dust, place then in an enclosed vessel, and raise the temperature to 94° Fahr., and let it remain thus for several hours. Remove and clean the article from the charcoal dust, and they will be found free from all odor.

APPROVED FRICTION MATCHES.—About the best known preparation for friction matches consists of gum arabic, 16 parts by weight; phosphorus, 9 parts; nitre, 14 parts; peroxyd of manganese, in powder, 16 parts. The gum is first made into a mucilage with water, then the manganese, then the phosphorus, and the whole is heated to about 130 degr. Fah. When the phosphorus is melted the nitre is added, and the whole is thoroughly stirred until the mass is a uniform paste. The wooden matches prepared first with sulphur, are then dipped in this and afterward dried in the air. Friction papers, for carrying in the pocket, may be made in the same manner, and by adding some gum benzoin to the mucilage they will have an agreeable odor when ignited.

MILL DAMS.—When building a dam, you should select the most suitable place. If you can, place it across the stream near a rocky bluff, so that the ends of the dam may run into the bluff. This will prevent the water running by at the ends of the dam. Build your dam very strong: if this is not done, they are breaking up often, causing ruinous expense in money and loss of time.

Rock Dams are incomparably the best in use, if there is plenty of material at hand for building, and a rock bottom to the stream; if there is not a rock bottom, you should dig a trench in the bottom, deep enough, so that the water cannot undermine it. This should be the same as if you were building the foundation of a large building. The wall to be built should be of a small, circular form, so that the back of the circle should be next to the body of water, which may by its pressure tighten it. To secure the water from leaking through at the ends of the dam, dig a ditch deeper than the bottom of the river; then fill this with small pieces of rock, and pour in cement. This cement is made of hydraulic cement, and is made of one part of cement to five parts of pure sand. It will effectually stop all crevices. A rock dam, if well built, will be perfectly tight. Use as large rock as you conveniently can move; building this wall 4 to 6 feet thick, according to the length of the dam, with jam or buttresses every place where they are needed to strengthen it. Make true joints to these rocks, especially on the ends so that they may join close together. When you have the outside walls laid in cement, for every layer fill the middle up with pieces of small rock, pouring in your grout, so that there may not be a crevice but what is filled. If there is any crevice or hole left open, the water will break through, wearing it larger and larger. If the stream is wide and large, it is necessary to build the dam in two sections, which should be divided by a waste way, necessary for the waste, or surplus water, to run over to keep the head in its proper place or height. Let each section, next to where the water is to be run over, be abutments, built to strengthen the dam. The last layer of rock, on the top where the waste water runs over, should project 5 or 6 inches over the back of the dam, so that the water may not undermine it. This last layer should be of large rocks and jointed true; then laid in hydraulic cement, in proportion of 1 of cement to 3 of sand. When the dam is built, the front should be filled up with coarse gravel or clay; this is best done with teams, as the more it is tramped the more durable it becomes.

Frame-Dams.—In building a frame-dam commence with a good foundation, laying the first sills in the bottom, of sufficient depth. They should be large square timbers that will last in the water without rotting. Where there is a soft foundation, the bottom should first be made level; then dig trenches for the mud sills, about 7 or 8 feet apart, lengthways of the stream, and 10 or 12 feet long. Into these first sills other sills must be framed, and put crosswise of the stream, 6 or 8 feet apart, to reach as far across the stream as necessary. Then two outside sills should be piled down with 2-inch plank driven down to a depth of 4 or 5 feet. If this can be done conveniently, they are to be jointed as closely as possible. It would be better to line with some stuff 1 inch thick; then with posts their proper length, about 12 or 14 inches square, which should be framed into the uppermost sills, in both sides, and all the way across the dam, from bank to bank, at a distance of 6 feet apart. Then, with braces to each post, to extend two-thir of the length of the post, where they should be joined together with a lock, instead of a mortise and tenon, with an iron bolt of 1 or 1¼ inches in diameter, going through both, and tightened with a screw and nut. When mortises and tenons are used, they often become rotten and useless in a few years. These braces should be set at an angle of 50 or 60° with the other end mortised into the mud sill. These braces require to be about 6 to 8 inches, and as long as you find necessary; being covered with dirt, it will not decay for a long time, as the air is excluded. These posts should be capped from one to the other, plate fashion. The posts should be lined with 2 or 2½ inch plank on the inside, pinned to the plank, and should, in the middle, be filled in with dirt.

If the stream is large and wide, the dam should be built in two sections, which should be divided by a waste-way for the surplus water, which should be in the centre of the dam, and sufficient for all the waste-water to run over. Let each section of the dam form an abutment next to the waste-way, placing cells or sills 4 feet apart the length of the waste-way; in each of these sills, posts should be framed, with a brace for the sides. These rows of posts, standing across the dam, will form the sectional abutments; the middle one may be constructed by being lengthways of the stream, with short braces, so that they will not be in the way of drift-wood passing down the stream; it being necessary for strong pieces for a bridge. Then cover the sills with an apron of 2-inch plank joined perfectly straight, to extend 30 or 40 feet below the dam, to prevent undermining of the dam. The planks which are used for the purpose of lining the posts which form the abutments of each section of the dam, and the ends of the waste-way, should be truly pointed, so as to prevent any leakage. The dam being built, the dirt should be filled in with teams, as the more it is tramped the better. Clay or coarse gravel is the best. Then place your gates on the upper side of the waste-way, the size that is necessary to a level with low-water mark; which gates are not to be raised, except in times of high water, as the proper height of the mill-pond should be regulated by boards placed over the gate for the desired head, as the water should be allowed to pass at all times freely over them. To strengthen the dam, if you think necessary, 2-inch plank may be used in lining the front side of the dam, long enough to reach from the bottom of the stream (on an inclined plane, and next to the body of water) to the top of the dam, and filled up nearly to the top of the dam with clay or gravel well trampled down.

Brush or Log Dams are very often used in small, muddy streams. When the bottom of the stream is of a soft nature, take a flat boat where you want to fix your dam, and drive piles the whole length of the stream, about 3 or 4 feet apart, as deep as you can. Take young oak saplings, pointed at the end, for the purpose. If you can, construct a regular pile-driver, similar to those in use for making trestle-work on the railways. This weight may be pulled up by horses instead of an engine. When you have finished driving piles, make some boxes or troughs of 2 or 3 inch plank, about 3 feet wide and as long as the plank is. Sink these in the water, the length of the dam, close to the piles, by loading them with

until they are at the bottom of the stream, filling in the
part of the dam with dirt and brush, nearly to the height
want it. This kind of dam will last a long time.

henever there is a small break in the dam or race, cut up some
ws and brush, put them in the break along with some straw
dirt, and ram them down with clay.

regard to the flume, the greatest care must be taken to insure
gth and durability, combined with tightness. Every step
n in its construction must be of such a nature as to unite these
ties in the highest possible degree, otherwise the whole is, in
nner, labor lost.

RS FOR DRUNKENNESS.—Take 5 grs sulphate of iron, 10 grs.
nesia, 11 drs. peppermint water, 1 dr. spirit of nutmeg; mix all
ther, and take twice per day.

MAKE GUN COTTON.—Take dry saltpetre, ½ oz.; strong oil
ol, ½ oz. Mix in a tumbler, add 20 grs. of dry cotton wool,
with a glass rod 5 minutes, remove the cotton and wash from
races of the acid in 4 or 5 waters; then carefully dry under
This is gun cotton.

HE DRUMMOND LIGHT is produced by directing a jet of mixed
gen and hydrogen upon a pencil of pure lime, the gases being
veyed in separate tubes or pipes, to within a very short distance
the aperture at which they are to be delivered, and then flow-
together and mixing in very minute quantity before combus-
takes place This arrangement is adopted to ensure safety.
gases are used in the proportion of 2 of hydrogen to 1 of oxy-
which form a dreadfully explosive mixture.

TRO GLYCERINE is made by submitting glycerine to the action
mixture of 2 parts of sulphuric and 1 part of nitric acid. The
of the sulphuric acid being to concentrate the nitric acid,
h is alone concerned in the reaction. In the apparatus ordi-
y used, the glycerine and the acids are allowed to mix in the
m, and are afterwards agitated for a short time in the recep-
into which they flow. The nitro-glycerine is then allowed
ttle at the bottom, the acids are drawn off and after a single
ing with water the explosive is ready for use.

E GREAT SECRETS FOR TRAPPING FOXES AND OTHER GAME.—
-rat musk and skunk musk mixed. Can be procured at the
gists, or from the animals themselves To be spread on the bait
y trap. This receipt has been sold as high as $75. *Another,
ng* $50, *for minks, &c.*—Unslaked lime, ½ lb.; sal-ammoniac,
or muriate of ammonia, 3 oz. Mix, and pulverize. Keep in
vered vessel a few days until a thorough admixture takes
. Sprinkle on the bait, or on the ground around the trap.
in a corked bottle.

OD FOR SINGING BIRDS.—Blanched sweet almonds, pulverized,
; pea meal, 1 lb.; saffron, 3 grs.; yolks of 2 hard boiled eggs.
ce all to a powder by rubbing through a sieve. Place the mix-
in a frying pan over a fire, and add 2 oz. butter and 2 oz.
y. Slightly cook for a few minutes, stirring well, then set off
ol, and preserve in a closely corked bottle.

OTOGRAPH PAINTING IN OIL COLORS.—TINTS FOR THE FIRST
TING.—FLESH.—*White and Light Red.*—White, Naples yellow,

and vermilion. White, vermilion, and light red. *Gray, Pearly, and Half Tints.*—White, vermilion, and black. White and terre verte. White, black, Indian red, and raw umber. *Deep Shades.*—Light red and raw umber. Indian red, lake and black. *Carnations.*—White and Indian red (powerful color). White and rose madder. White and lake. HAIR.—*Light Hair.*—White and yellow ochre. White and Roman ochre. White and Vandyke brown for the dark parts. White and raw umber for the dark parts. *Dark Brown Hair.*—Raw and burnt umber. White and raw umber. White and Vandyke brown. TINTS FOR THE SECOND AND THIRD PAINTING.—*High Lights.*—White and Naples yellow. *Carnations.*—Rose madder and white. Indian red, rose madder, and white. *Green Tints.*—White and ultramarine, with any of the yellows. White and terre verte, with the addition of a little raw umber. The above green tints may be converted into green grays. *Gray Tints.*—Ultramarine, light red, and white. Indian red, lake, black and white. White, ultramarine, Indian red, and raw umber. *Purple Tints.*—Any of the lakes or red madders, with ultramarine and white. *Powerful Shadow Tints.*—Indian red, purple lake, and black. Indian red, raw umber, and black. *Strong Glazing Colo* —Light red and lake. Brown madder. Vandyke brown, Indian red, and lake asphaltum. DRAPERIES.—BACK GROUND COLORS.—*Pearly.*—White, vermilion, and blue. White, vermilion and black. White and black. *Gray.*—White, Venetian red and black. *Yellow.*—Yellow ochre and white. *Olive.*—Yellow ochre, terre verte, and umber. *Stone.*—Raw umber and yellow. Black, white, and raw umber. *Sky.*—French blue and white. French blue, vermilion, and white. *Edges of Clouds.*—Yellow ochre and white. *Clouds.*—Indian red, lake, and white. Brown madder, French blue, and white.

PHOTOGRAPH WATER COLORS.—FLESH TINTS.—No. 1. *Fair Complexion.*—Light red, a little carmine or vermilion, and Indian yellow. Be careful in using the latter, and, in the flesh tints of very fair children, allow the vermilion to predominate; carnations, rose madder, and, if the face be full of color, add a little vermilion to it. 2. *Middling Complexion.*—Much the same as No. 1, saving that the light red must be in excess over the other colors—carnations rose madder, and lake. 3. *Dark Complexion.*—Light red and Indian yellow, or light red and Roman ochre, and, if the complexion be generally ruddy, you may add a little Indian red, but it must be sparingly used, as it is a powerful color, and likely to impart a purple tone to the flesh. Carnations chiefly lake, but if the complexion be warm, lake and a little yellow. The carnations for children's portraits are rose madder and vermilion, inclining more to the latter tint. Aged persons have rose madder, and a little cobalt to give a cold appearance to the color in their cheeks and lips. These tints, Nos. 1, 2, and 3, are indispensable as general washes, for the purpose of receiving the other colors, which are to be worked over them to bring up the complexion to the life. Uncolored photographic portraits vary so much in tone, that the beginner will, perhaps, find some difficulty in mixing up the tints for the washes. He must note that the warm-toned ones do not require so much Indian yellow as the cold ones do.

To Isochronise a Pendulum Spring.—A pendulum is isochronal hen its vibrations are performed in equal times, whether the ibrations be large or small, but it can only possess this property y being constrained to move in a cycloidal arc. This is managed y causing the spring to wrap and unwrap itself round two equal ycloidal cheeks, the diameter of whose generating circle is equal o half the length of the pendulum. Isochronism is closely pproximated in practice by causing the pendulum to describe a very small circular arc.

To Whiten Silver Watch Dials.—Get a piece of cork, a jeweler's scrub brush, some puttice powder, a small japanned saucepan, a spirit lamp, a piece of wire bent into a bow, and a little vitriol Lay the dial on the cork, wet the end of the brush, dip it in the puttice powder, and scrub the dial very clean; then put about a cupful of water in the saucepan, and enough vitriol to make it very tart; make it hot, lay the dial on the wire face upwards, make it white hot over the spirit lamp, drop it flat into the vitriol and water, let it lay a few seconds, if it is at all stained put it in again for a short time; if that does not take it out it must be scrubbed over again: the most particular point is getting the dial to the right heat.

To Construct an Æolian Harp.—Make a box with the top, bottom, and sides of thin wood, and the ends 1½ inch beech, form it the same length as the width of the window in which it is to be placed The box should be 3 or 4 inches deep, and 6 or 7 inches wide In the top of the box, which acts as a sounding board, make 3 circular holes about 2 inches in diameter, and an equal distance apart Glue across the sounding board, about 2½ inches from each end, 2 pieces of hard wood ¼ inch thick, and ½ inch high, to serve as bridges. You must now procure from any musical instrument maker twelve steel pegs similar to those of a pianoforte, and 12 small brass pins Insert them in the following manner into the beech. first commence with a brass pin, then insert a steel peg, and so on, placing them alternately ½ in. apart, to the number of twelve Now for the other end, which you must commence with a steel peg, exactly opposite the brass pin at the other end, then a brass pin, and so on, alternately, to the number of 12; by his arrangement you have a steel peg and a brass pin always opposite each other, which is done so that the pressure of the strings on he instrument shall be uniform Now string the instrument with 12 irst violin strings, making a loop at one end of each string, which put over the brass pins, and wind the other ends round the opposite steel pegs. Tune them in unison, but do not draw them tight. To increase the current of air, a thin board may be placed about inches above the strings, supported at each end by 2 pieces of wood. Place the instrument in a partly opened window, and, to ncrease the draft, open the opposite door.

To Forge a Twist Drill.—It is necessary to forge a flat blade similar to a flat drill, and then twist this blade into the resemblance required, then, with a light hammer and careful blows, hammer the twisted edges so that they will be thicker than the central line of the tool. This will give greater strength and a better drill, and, to cut well, the central line or cutting point must be made quite thin. Be careful to get the *same twist* at the point of the drill as upon the body of the drill The inexperienced often leave the point straight, with no twist, like a flat drill.

MOULDING SAND FOR CASTING BRASS OR IRON.—The various kinds of good moulding sand employed in foundries for casting iron or brass, have been found to be of almost uniform chemical composition, varying in grain, or the aggregate form only. It contains between 93 and 96 parts silex, or grains of sand, and from 36 to 6 parts clay, and a little oxide of iron, in each 100 parts. Moulding sand, which contains lime, magnesia, and other oxides of metal, is not applicable, particularly for the casting of iron or brass. Such sand is either too close, will not stand or retain its form, or it will cause the metal to boil through its closeness.

REFINING FLUXES, FOR METALS.—Deflagrate, and afterwards pulverize, 2 parts of nitre and 1 part of tartar. The following fluxes answer very well, provided the ores be deprived of all their sulphur, or if they contain much earthy matter, because, in the latter case, they unite with them, and convert them into a thin glass, but, if any quantity of sulphur remains, their fluxes unite with it, and form a liver of sulphur, which has the power of destroying a portion of all the metals, consequently the assay must be, under such circumstances, very inaccurate. Limestone, feldspar, fluorspar, quartz, sand-slate, and slags, are all used as fluxes. Iron ores, on account of the argillaceous earth they contain, require calcareous additions; and the copper ores, rather slags, or nitrescent stones, than calcareous earth.

BURNING IRON CASTINGS TOGETHER.—The usual mode is by imbedding the castings in the sand, having a little space left vacant round about the joint where it is to be burned. Two gates must then be provided, one lying on a level with the lower side of this space, and the other raised so that the metal, which must be very hot, is poured in at the higher one; it passes round, fills up the space, and runs off at the lower gate. A constant supply of metal is thus kept up, till the parts of the casting are supposed to be on the eve of melting. The lower gate is then closed, and the supply stopped. When cool, and the superfluous metal chipped off, it forms as strong a joint as if it had been original.

POT METAL.—Copper, 40 lbs.; lead, 16 lbs.; tin, 1½ lbs.

TO BEND GLASS TUBES.—Hold the tube in the upper part of the flame of a spirit-lamp, revolving it slowly between the fingers; when red hot it may be easily bent into any desired shape. To soften large tubes a lamp with a double current of air should be used, as it gives a much stronger heat than the simple lamp.

TO LESSEN NOISE IN WORKSHOPS.—Place a piece of India-rubber under the feet of the machines or benches on which the machines are placed.

TO SOLDER TORTOISE SHELL.—Bring the edges of the pieces of shell to fit each other, observing to give the same inclination of grain to each, then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great as to *burn* the shell, therefore try it first on a white piece of paper.

TO MAKE LINSEED AND COTTON SEED OILS.—In making linseed oil quite a variety of machinery is used, more or less expensive according to the enterprise and capital of the manufacturer. The seed is first passed through iron rollers, to be crushed or ground, one of the rollers is made to revolve more rapidly than the other, which subjects each seed to a pulling as well as to a crushing process. The meal is taken from the mill to the 'chasers,' when it is subjected to another crushing process, more severe than the first. The chasers are 2 large circular stones about five feet diameter, and 18 inches thick, rolling upon a third stone in the manner of an old-fashioned bark or cider mill. These heavy stones start the oil from the seed, and to keep it from adhering to the chasers it is moistened with water. The meal is next put into an iron cylinder, which is kept revolving over a fire until the water is evaporated. Much of the skill of making oil depends upon this heating process. It must not be scorched, and yet it must be brought up to a high temperature, so that it will readily give out its oil. The presses are of various structure, some of them are patented, and others not open to public inspection. In one, the vats or hoops holding about 2 bushels each, were placed opposite each other against two immense beams or uprights, made fast in the foundations of the building. The followers were forced down upon the meal by 2 large levers worked by hydraulic powers. The meal is kept under pressure about an hour, and the two presses work up about 92 bushels of seed every 24 hours, the mill being kept running night and day. The product is not far from 2 gals. of oil from a bushel of seed, a little more or less, according to the quality of the seed and the skill in pressing. The cakes, as taken from the press, are generally sold by the ton without grinding, and are generally exported in this form, but when there is a market in the vicinity of the mill, the cakes are put under the chasers, ground into meal, bagged and sent to the feed stores. The price of the cake is from $30 to $40 per ton; ground into meal it retails at about $2 per 100 lbs. The process of making the cotton seed oil and cake is nearly the same. The seed of the upland cotton is surrounded with a husk, to which the cotton adheres. It is surrounded with a soft down after it leaves the gin, and in this condition it is purchased from the planter. The seed makes better oil and better meal when it is deprived of this hull and down. The yield of oil is about 90 gallons per 100 bushels of the Sea Island, or 2 gals. to 56 lbs. of the hulled cotton seed.

BLACK DIP FOR BRASS.—Hydrochloric acid (commonly called smoking salts), 12 lb., sulphate of iron 1 lb., and pure white arsenic 1 lb. This dip is used in all the large factories in Birmingham, but the dip used in the London trade is 2 oz. of corrosive sublimate, in 1 pt. of the best vinegar, cork both air tight in a bottle, let it stand 24 hours, then it is fit for use.

TO RE-COVER HAMMERS IN PIANOS.—Get felt of graduated thickness, cut it in strips the exact width, touch only the two ends with glue, not the part striking the strings. Hold in place with springs of narrow hoop iron.

ARTIFICIAL PEARLS.—Are made from beads of opaline glass filled with gum, the polish of the glass being reduced by the vapor of hydrofluoric acid.

STALBA'S NICKEL PLATING PROCESS.—Consists in plating with nickel, by the action of zinc upon salts of nickel, in the presence of chloride of zinc and the metal to be plated. By this process, Stalba states that he has succeeded in plating objects of wrought and cast iron, steel, copper, brass, zinc and lead. It is only necessary that the size of the objects should permit them to be covered entirely by the plating liquid, and that their surfaces should be free from dirt. The following is the *modus operandi*:—A quantity of concentrated chloride of zinc solution is placed in a cleaned metallic vessel, and to this is added an equal volume of water. This is heated to boiling, and hydrochloric acid is added drop by drop, until the precipitate which had formed on adding the water has disappeared. A small quantity of zinc powder is now added, which produces a zinc coating on the metal as far as the liquid extends. Enough of the nickel salt (the chloride or sulphate answers equally well) is now introduced to color the liquid distinctly green; the objects to be plated are placed in it, together with some zinc clippings, and the liquid is brought to boiling. The nickel is precipitated in the course of 15 minutes, and the objects will be found to be completely coated. The coating varies in lustre with the character of the metallic surface; when this is polished, the plating is likewise lustrous and *vice versa*. Salt of cobalt affords a cobalt plating, which is steel gray in color, not so lustrous as the nickel, but more liable to tarnish.

GUAGING STREAMS.—Multiply the square root of the cube of the height in inches of the water on the sill of the weir or guage by the constant 17.13, which will give the number of gallons per minute. If the water has any initial velocity it must be determined by experiment, and in that case multiply the square of the height by the square of the velocity, and by 0.8; to the product add the cube of the height, extraet the square root of the sum, and multiply by 17.13 as before.

TO PREVENT PITTING WITH SMALL-POX.—As soon as the disease is distinguished, apply an ointment made of lard and charcoal to the face, neck, hands, &c., and continue until all signs of suppurative fever have ceased.

CORNISH REDUCING FLUX.—Tartar 10oz., nitre 3oz., and 6drs. borax, 3oz. and 1 dr. Mix together.

TO MAKE COAL OIL.—Break the Coal or shale into small pieces and put from 10 to 16 cwt. in an iron retort, heated to a dull red color. Lute the retort door and keep up the heat for 24 hours. By this process a vapor is thrown off which passes through ranges of cisterns until it condenses, when it is run into cisterns. This crude oil, when refined and purified, is sold as parrafin oil, and solid parrafin for making candles is made from it.

DAMASCUS STEEL.—It is said that this steel consists of a highly carburetted metal which by undergoing careful cooling and annealing separates into two compounds of iron and carbon, giving it the peculiar appearance known as "Damasceening." The wonderful strength of this steel is no doubt owing to careful manipulation.

Filing Saws.—The grand secret of putting any saw in the best possible order, consists in filing the teeth at a given angle to cut rapidly, and of a uniform length so that the points will all touch a straight edged rule without showing a variation of the hundredth part of an inch. Besides this, there should be just set enough in the teeth to cut a kerf as narrow as it can be made, and at the same time allow the blade to work freely without pinching. On the contrary, the kerf must not be so wide as to permit the blade to rattle when in motion. The very points of the teeth do the cutting. If one tooth is a twentieth of an inch longer than two or three on each side of it, the long tooth will be required to do so much more cutting than it should, that the sawing cannot be done well, hence the saw goes jumping along, working hard and cutting slowly; if one tooth is longer than those on either side of it, the short teeth do not cut although their points may be sharp. When putting a cross cut saw in order, it will pay well to dress the points with an old file, and afterwards sharpen them with a fine whetstone, much mechanical skill is necessary to put a saw in prime order, one careless thrust with a file will shorten the point of a tooth so much that it will be utterly useless, so far as cutting is concerned; the teeth should be set with much care, and the filing done with the greatest accuracy. If the teeth are uneven at the points, a large flat file should be secured to a block of wood in such a manner that the very points only may be jointed, so that the cutting edge of the same may be in a straight line, or circle, if it is a circular saw; every tooth should cut a little as the saw is worked. The teeth of a hand saw for all kinds of work should be filed fleaming, or at an angle on the front edge, while the back edges may be filed fleaming, or square across the blade. The best way to file a circular saw for cutting wood across the grain, is to dress every fifth tooth square across, and apart one twentieth of an inch shorter than the others, which should be filed fleaming at an angle of about forty degrees.

As regards such saws as are used for cutting up large logs into lumber it is of the utmost importance to have them filed at such an angle as will ensure the largest amount of work with the least expenditure of power. The following diagrams will help to illustrate our meaning. Fig. 1. shows the shape of teeth which nearly all ex-

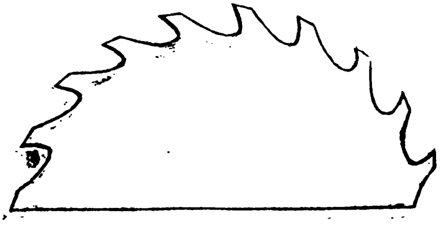

Fig. 1.

perienced mill-men consider as that standard form which combines the greatest amount of strength and capacity for rapid work, with the minimum of driving power while doing the work.

Figure No. 2 represents a passable form of teeth which are capable of doing a good deal of work, but their great weakness lies in their slender points. Look out for "breakers" when teeth of this description are passing through dry spruce or hemlock knots.

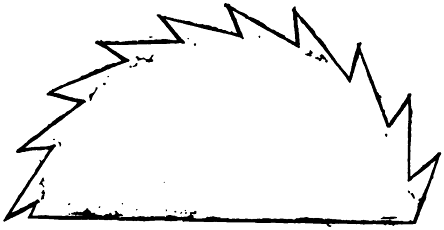

Fig. 2.

Fig. No. 3 illustrates the appearance of one of those intolerable wood rasps which are altogether too common in saw-mills. Only think what an appalling waste of valuable power is required to drive a "jigger" like this through a large log!

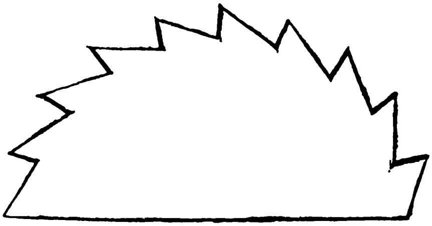

Fig. 3.

Fig. 4, at *a*, is intended to show the method of ascertaining the proper angle, that of sixty degrees, at which such saws *should* be filed. The diagram being self-explanatory requires but little further elucidation here. A quarter circle with lines radiating from the centre towards the circumference is represented near the verge of the segment of a circular saw. The lower part corresponds with the level of the horizon, and the higher part at 90° corresponds e zenith or meridian, where the sun appears at noon-day. half-way up is 45°; look up a little higher and you will indicated by the radiating line which runs parallel with le of the tooth of the saw and this is the guide you must n filing. The same rule is seen applied to a straight mill *b*.

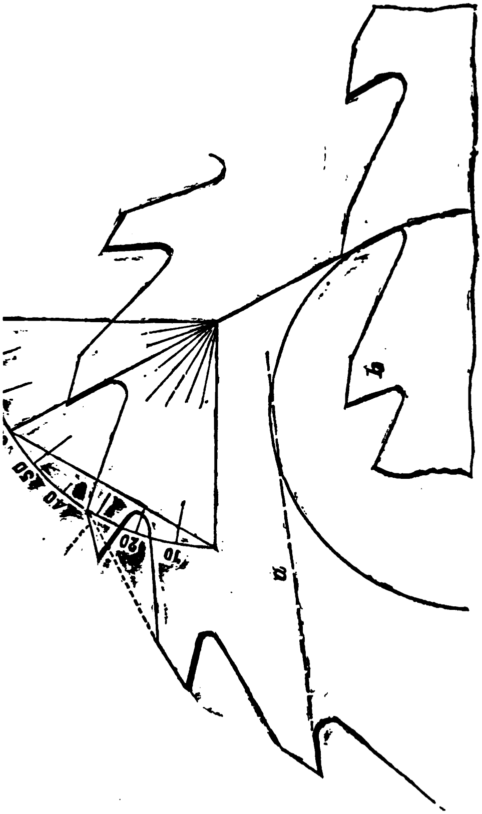

FIG. 4.

good authorities contend that mill saws should in on case ith the instrument commonly used for that purpose, but that in lieu thereof the teeth should be spread out at the points with the swage or upset to a sufficient extent to permit the body of the saw to operate without binding. Both instruments require to be skilfully handled, and the swage, when used in this way, has proved itself equal to every emergency without the risk of breaking the teeth. It would be quite safe to say that the saw-set should only be used on saws of this description with the most extreme caution and care. Every manufacturer, however, has his own opinion, and consequent practice on the subject, some contending that one way is right and the other directly the reverse.

To Repair Fractured Circular Saws.—The best way to do this is to drill a small round hole at the termination of the crack, which effectually prevents its further extension. I have seen some circular saws very neatly repaired by riveting thin clamps to each side of the fracture, both clamps and rivets being countersunk so they will be level with the surface of the saw, and placed in such a position across the crack as to impart the greatest possible strength to the weakest place. A table of the speed of circular saws can be seen at page 169, this, however, does not embrace the velocity of shingle machine saws, which ought to make at least 1400 revolutions per minute.

To Mend Broken Cross cut Saws.—In the first place scarf off the broken edges in such a manner that when lapped over each other they will be about the same thickness as the rest of the plate, and rivet them together loosely with iron rivets inserted through holes which must be punched for that purpose; the ends must be united with great accuracy so that the teeth, &c., of the saw may range truly. Now place the saw in the fire, then a flux of powdered borax and sal ammoniac is flowed all over it after having it raised to the proper heat. See page 173 for preparing and using the composition. Return the saw to the fire and when it is raised to the proper welding heat, place it on the anvil and unite the joint as rapidly as possible with the hammer; be careful not to heat so hot as to injure the steel. When the job is well done, and the part properly tempered, it will be found as strong as the rest of the plate. I know one blacksmith in Canada who told me that this class of work was the best paying part of his business.

Power of Engines.—Horse-power in steam engines is calculated as the power which would raise 33,000 lbs. a foot high in a minute, or 90 lbs. at the rate of 4 miles an hour. One horse-power is equal to the lifting, by a pump, of 250 hogsheads of water ten feet in an hour. Or it would drive 100 spindles of cotton yarn twist, or 500 spindles of No. 48 mule yarn, or 1000 of No. 110, or 12 power looms. One horse-power is produced by 19 lbs. of Newcastle coals, 50 lbs. of wood, or 34 lbs. of culm. Coals 1, wood 3, and culm 2, give equal heats in the production of steam.

Sixteen lbs. of Newcastle coal converts 100 lbs. of water into steam. A bushel of coal per hour raises steam to 15 lbs. the square inch, whose velocity is 1350 feet per second, and 2 bushels raise it to 120 lbs., or velocity of 3800 feet per second. A horse-power requires from 5 to 7 gallons of water per minute for condensation of steam. A steam engine whose cylinder is 31 inches, with

17 double strokes per minute, performs the constant work of 40 horses with 5 tons of coal per day. One of 19 inches and 25 strokes of 12 horses, with 1½ tons per day. They raise 20,000 cubic feet of water 24 feet for every hundred weight of coals. One bushel of good coals raises from 24 to 32,000,000 lbs. one foot per minute. Four bushel of coals per hour, with a cylinder of 31½ inches and 17½ strokes of 7 feet per minute, is a force equal to 40 horses constantly. A rotative double engine, with a cylinder of 23.75 inches, making 21.5 strokes of 5 feet per minute, is a 20 horse-power; and a cylinder of 17.5, making 25 strokes of 4 feet is a 10 horse-power; the consumption of coals being proportional.

ON STEAM BOILERS.—Regarding the steam engine as under Providence, one of the most powerful civilizing agents in existence, and the procuring cause of the bread of many thousands of our fellow-beings, it seems highly proper to place on record some well-known facts regarding boiler construction and the properties of steam, &c., in order that such knowledge may be used to mitigate the number of those lamentable accidents which, in too many cases, owe their origin to ignorance and incapacity. Regarding the *form* of boilers, it is now an ascertained fact that the maximum strength is obtained by adopting the cylindrical or circular form, the haycock, hemispherical, and waggon-shaped boilers, so general at one time, have now deservedly gone almost out of use. Good boiler plate is capable of withstanding a tensile strain of 50,000 lbs. or 60,000 lbs. on every square inch of section; but it will only bear a third of this strain without permanent derangement of structure, and 4000 lbs., or 3000 lbs. even, upon the square inch, is a preferable proportion. It has been found that the tenacity of boiler-plate increases with the temperature up to 570°, at which point the tenacity commences to diminish. At 32° the cohesive force of a square inch of section was 56,000 lbs.; at 570° it was 66,500 lbs.; at 720°, 55,000 lbs.; at 1050°, 32,000 lbs.; at 1240°, 22,000 lbs.; and at 1317°, 9,000 lbs. Strips of iron, when cut in the direction of the fibre, were found by experiment to be 6 per cent. stronger than when cut across the grain. The strength of riveted joints has also been demonstrated by tearing them directly asunder. In two different kinds of joints, double and single riveted, the strength was found to be, in the ratio of the plate, as the numbers 100, 70, and 56.

Assuming the strength of the plate to be	100
The strength of a double riveted joint would be, after allowing for the adhesion of the surfaces of the plate..	70
And the strength of a single riveted joint........................	56

These figures, representing the relative strengths of plates and joints in vessels required to be steam and water tight, may be safely relied on as perfectly correct. The accidental overheating of a boiler has been found to reduce the ultimate or maximum strength of the plates from 65,000 to 45,000 lbs. per square inch of section. The greatest caution should be exercised against low water and incrustations in the boiler, for, in that case, the plates over the furnace are apt to get red hot, and, when in this state, they have lost five-sixths of their strength, and there is then danger of bursting the boiler, even at the common working pressure, as a force of less than one-sixth of the usual strength of the plates will be found sufficient to do so. To let in a great body of water on the incandescent plates at such a time only increases the danger, by suddenly generating a large volume of highly elastic steam. The proper way, during such emergency, is not to draw the fires, for then there is no time for that, but to open the furnace doors and dash in a few bucketsful of water upon the fire, and blow off the steam as rapidly as possible. Every description of boiler used in manufactories or on board of steamers should be constructed to a bursting pressure of 400 to 500 lbs. on the square inch; and locomotive engine boilers, which are subject to much harder duty, to a bursting pressure of 600 to 700 lbs. Such boilers are usually worked at 80 to 100 lbs. on the inch, but are frequently worked up to a pressure of 120, and, when rising steep grades, sometimes even as high as 200 lbs. to the square inch. In a boiler subject to such an enormous working pressure, it requires the utmost care and attention on the part of the engineer to satisfy himself that the flat surfaces of the fire box are capable of resisting that pressure, and that every part of the boiler is so nearly balanced in its powers of resistance as that, when one part is at the point of rupture, every other part is at the point of yielding to the same uniform force; for we find that, taking a locomotive boiler of the usual size, even with a pressure of 100 lbs. on the square inch, it retains an expanding force within its interior of nearly 60,000 tons, which is rather increased than diminished at a high speed. To show the strain upon a high-pressure boiler, 30 feet long, 6 feet diameter, having 2 centre flues, each 2 feet 3 inches diameter, working at a pressure of 50 lbs. on the square inch, we have only to multiply the number of the square feet of surface, 1030, exposed to pressure, by 321, and we have the force of 3319 tons, which such a boiler has to sustain. To go farther, and estimate the pressure at 450 lbs. on the square inch, which a well-constructed boiler of this size will bear before it bursts, and we have the enormous force of 29,871, or nearly 30,000 tons, bottled up within a cylinder 30 feet long and 6 feet diameter. Boilers in actual use should be tested at least once a year, by forcing water into them by the hand feed-pump, until the safety-valve is lifted, which should be loaded with at least twice the working pressure for the occasion. If a boiler will not stand this pressure it is not safe, and either its strength should be increased or the working pressure should be diminished. Internal flues, such as contain the furnace in the interior of the boiler, should be kept as near as possible to the cylindrical form; and, as wrought iron will yield to a force tending to crush it about one-half of what would tear it asunder, the flues should in no case exceed one-half the diameter of the boiler, with the same thickness of plates they may be considered equally safe with the other parts. The force of compression being so different from that of tension, greater safety would be ensured if the diameter of the internal flues were in the ratio 1 to 2½ instead of 1 to 3 of the diameter of the boiler. As regards the relative size and strength of flues, it may be stated that a circular flue 18 inches in diameter will resist double the pressure of one 3 feet in diameter. Mill owners, with plenty of room and a limited experience with steam power, would do well to dispense with boilers containing many flues, the expense is greater and the durability less than where there is two or three only. The foam caused by a large number of flues is apt to deceive an inexperienced engineer, causing him to believe that there is plenty of water in the boiler when he tries the gauge cock. when there is really but very little, often causing an explosion. Some mill-owners insert a fusible plug in the crown of the furnace to indicate danger from low water. As common lead melts at 620°, a rivet of this metal, 1 inch in diameter, inserted immediately over the fire place, will give due notice, so that relief may be obtained before the internal pressure of the steam exceeds that of the resisting power of the heated plates. In France, an extensive use is made of fusible metal plates, generally covered by a perforated metallic disk, which protects the alloy of which the plate is composed, and allows it to ooze through as soon as the steam has attained the temperature necessary to insure the fusion of the plate, which varies from 280° to 350°. The reader will find a number of such alloys under the tabular view of alloys and their melting heats, page 243. Another method is the bursting plate, fixed in a frame and attached to some convenient part of the upper side of the boiler, of such thickness and ductility as to cause rupture when the pressure exceeds that on the safety valve. But, beyond all question, constant use should be made on all boilers of a good and reliable system of steam gauges, glass tubes, guage cocks, safety valves, &c. By means of the glass tubes affixed to the fronts of the boilers, the height of the water within the boiler is indicated at once, for the water will stand at the same height in the tube that it stands in the boiler, communication being established with the water below and the steam above, by means of stop cocks. The guage cocks are cocks penetrating the boiler at different heights, and which, when opened, tell whether it is water or steam that exists at the level at which they are respectively inserted. The average level of the water in the boiler should be above the centre of the tube, and the lowest of the guage cocks should always run water, and the highest blow steam. The steam gauge indicates the pressure of steam by a hand on a dial. It sometimes happens that the glass tube gets choked up, and, to correct this, the cocks connecting the tube with the boiler should be so constructed that the tube may be blown through with the steam, to remove any obstacle that may interfere with its use. By blowing off the boiler frequently, a large amount of calcareous, and, on ocean vessels, saline matter, will be got rid of, which otherwise would cause trouble and perplexity by forming incrustations and deposits on the boiler, and which interferes most seriously with the transmission of the heat from the boiler plates to the water. In many cases the plates get red hot, causing the scale to crumble ; the water thus suddenly admitted to the highly heated surface is at once transformed into highly rarefied steam, and the boiler is bursted. Too much caution cannot be exercised to see that the safety valve is properly loaded and that no impediment exists to impair its free action, and that all the other apertures, valves, &c., belonging to the boiler are in good working order, but be specially particular that the care and management of the whole is entrusted to a person well recommended for caution and intelligence in his profession. No fact is better ascertained than that the great majority of boiler explosions have resulted from the employment of ignorant and incapable practitioners, who, being utterly oblivious to all sense of danger on their own account, cannot be expected to care for the safety of others. For *cements* for Steam Boilers, &c., see page 182. For preventing *incrustation*, see page 189, to which I will here add that Irish moss is also a good preventive of scale. Regarding the *power* of boilers, it may be stated that a boiler 30 feet long and 3 feet in diameter, will afford $30 \times 3 \times 3.14 \times 2 - 141.30$ square feet of surface, or steam for 14 horse-power, if 10 feet are assumed for one horse-power. Two short boilers are preferable to one long one, on account of having more fire surface,—it being always necessary to have as much fire surface as possible to make the best use of the fuel—as the hotter the surface is kept, the less fuel it takes to do the same amount of work. In some localities, such as the lumbering territory of New-Brunswick, it would be no economy to save fuel, many of the mills driven by water being put to a heavy expense in removing and burning off the debris. When there is a large furnace it gives the fireman a better chance to keep the steam regular, for when clearing out one part of the furnace, he can keep a hot fire in the other. For each horse-power of the engine there ought to be at least one square foot of grate, and three feet would be better. In setting a boiler, arrangement should be made to carry on combustion with the greatest possible heat. This requires good non-conductors of heat, such as brick, with which to surround the fire. If these bricks are of a white color, the combustion is more perfect than if of a dark color. The roof, as well as the sides, of the furnace should be of white fire-brick. The bars of the furnace should be 18 or 20 inches below the boiler or crown of the furnace. The fire should be kept open and thin, and frequently and sparingly supplied, to allow the air to enter between the bars, for the better consumption of the inflammable gases. The bars should slope downward toward the back part, about half an inch to the foot. The ashes should be often cleaned out, and not suffered to accumulate, otherwise it will stop the draft, burn out the bars, and take more fuel. A crack in a boiler plate may be closed by boring holes in the direction of the crack and inserting rivets with large heads, so as to cover up the imperfection. If the top of the furnace be bent down, from the boiler having been accidentally allowed to get short of water, it may be set up again by a screw-jack, a fire of wood having been previously made beneath the injured plate; but it will in general be nearly as expeditious a course to remove the plate and introduce a new one, and the result will be more satisfactory. There is one object that requires very particular attention, and which must be of a certain size to produce the best effect, and that is the flue leading from the boiler to the chimney, as well as the size and elevation of the chimney itself. Every chimney should be built several feet above the mill house, so that there is no obstruction to break the air from the top of the chimney. In England a factory chimney suitable for a 20 horse-power boiler is commonly made about 20 inches square inside, and 80 feet high, and these dimensions are correct for consumption of 15 lbs. coal per horse-power per hour, a common consumption for factory engines. In the Dominion of Canada and the United States, chimneys of plate iron, from 30 to 50 feet high, are in quite common use by owners of saw, and other mills, and they seem to answer every requirement.

COMPOSITION FOR COVERING BOILERS, &C.—Road scrapings, free from stones, 2 parts; cow manure, gathered from the pasture, 1 part; mix thoroughly, and add to each barrowful of the mixture 6 lbs of fire clay; ½ lb. of flax shoves or chopped hay, and 4 ozs. teased hair. It must be well mixed and chopped; then add as much water as will bring it to the consistency of mortar,—the more it is worked the tougher it is. It may either be put on with the trowel or daubed on with the hand, the first coat about 1 inch thick. When thoroughly dry, another, the same thickness, and so on, three inches is quite enough, but the more the better. Let each coat be scored like plaster, to prevent cracks, the last coat light and smooth, so as to receive paint, whitewash, &c. The boiler, or pipes, must first be brushed with a thin wash of the mixture to ensure a catch.

RULE FOR SIZE OF CYLINDER.—The requisite diameter of cylinder for a 25 horse beam engine is 28 inches, and about 5 feet stroke. The nominal horse-power of any sized cylinder can be found by the following formulæ:—For low pressure or beam engines, divide the area of cylinder by 25, which will give the number of horse-power. For high pressure horizontal engines divide the area of cylinder's diameter by 12·5, which will give the number of horse-power, including all friction.

STROKE OF ENGINES.—The stroke of an engine varies according to circumstances, which the designer must take into consideration, but the general rule is to make the stroke about twice the diameter of the cylinder. The diameter of the fly wheel should be about 4 times the stroke of the engine, and the rim should weigh about 3 cwt. per horse power.

BALANCE WHEELS.—Every balance wheel should be speeded up so as to run twice or three times as fast as the crank shaft it is intended to balance. When a balance wheel is applied in this way it makes the machine run a great deal more steadily, for, when the balance wheel is geared into the crank shaft, and runs two or three times faster than the crank shaft, it forms a power of itself, when going over the centre, which propels the crank shaft until it reaches the quarter where it again takes its power from the machine. Although it takes an additional shaft and gears to apply a balance wheel in this way, the saving of metal in the balance wheel fully compensates for the extra labour, for, when a balance wheel is speeded three times as fast as the crank shaft, it needs only one third of the metal in it that it would were it not speeded up at all, and if balance wheels were applied in this way generally it would make all engines run far more steadily.

TO STRAIGHTEN SHAFTING.—This should be done by centreing, then put it into a lathe, and square the ends up with what is called a side tool. After doing this, take a piece of chalk and try it in several places, to find out where the worst crooks are: then, if you have not a machine for springing shafting, spring it with a lever where the most crook is, and continue this operation till the shaft is straight.

Turning Shafting.—To do this properly, two chips should always be run over the shaft, for the reason that it saves filing and leaves the shaft truer and more round, and on shafts thus turned, the time saved in filing more than compensates for the time lost in turning. Before you commence you will put your feed belts or gear on a coarse feed; turn off one a sixty-fourth of an inch larger than the size required; having turned off this chip, commence the finishing chip, and turn it small enough to have the pully wring on about an inch without filing. This will leave it large enough to file and finish. If there are couplings to go on a shaft, with holes smaller than the holes in the pulleys, the ends of the shaft, where they fit on, should be turned down to a sixty-fourth of an inch of the size required before any part of the shaft is finished; that is, every part of a shaft should be turned to within a sixty-fourth of an inch of the size required before any part if it has the finish-chip taken off. The reason for that is that it leaves every part of the shaft perfectly true, which would not be the case were it done otherwise. Having done this, you will file the shaft so that the pulleys will slide on, and the couplings so that they will drive on; polish the shaft with a pair of polishing-clamps and some emery and it is done.

Working Steel for Tools.—In working steel for tools, great care should be taken to hammer all sides alike, for if one side is hammered more than another it will cause it to spring in hardening. Again, steel, when being hammered, should be heated as hot as it will stand, until finishing and should then be hammered until almost black hot, for the reason that it sets the grain finer, and gives the tool a better edge. The reason for heating the steel so hot while hammering is simply because it makes the steel tougher when hardened, and softer when annealed; while, if it were worked at a low red heat, the continued percussive shocks of the hammer would so harden it as to make it almost impossible to anneal it, and at the same time render it brittle when hardened.

Tempering Tools.—Drawing the temper of tools is usually done in a charcoal flame, and to draw the temper of a tool properly it should be held in the thickest part, or the part not requiring any temper towards the fire, and in the meantime, should be often wiped with a piece of waste or rag, dipped in oil. The oil keeps the temper even, and prevents it drawing more to one place than another. And in drawing the temper of any tool it should be drawn very slowly, otherwise it will run too far ere you are aware of it. Lancet blades and razors should be drawn to a straw color. Knife blades and chisels should be drawn to a copper or almost red color. Plane irons, shaving knives and shoemakers knives the same temper; cold chisels and stone drills, should be drawn to a dark blue. Fluted reamers should only be drawn to a straw color, on the end, as they never break elsewhere, and keep their size longer by leaving the lips hard. Half round or tapering reamers, also taps, dies, and drills, should be drawn to a straw

Jijucs and gauges, also common lathe tools, need no ing, being tempered enough when merely hardened.

LLEABLE CAST IRON.—The great secret of this sort of work is annealing, which if not done properly the castings are of no it all. The best mode is to take an iron pan, say one foot re; put in a layer of charcoal, then some of the castings, then her layer. When the pan is full cover it over with some sand, ep the charcoal from burning away. Put on an old piece of for a lid to cover all, put it in the annealing furnace, and get eat up quite slow and gradually, taking care not to get the up too quick. After you have got it to the proper heat, which is, the castings must be red hot through; keep it at this heat or 6 hours, then let your fire die gradually out, or, if you to take some out and put more in, take them to a corner and them, pan and all,—let them lie there till properly cooled. rding the melting, procure not less than two good sorts of pig iron, which you may mix with some good scrap if you se; the casting, melting, and moulding are conducted in the manner as common cast-iron, only the metal being hard, casting, you have to make properly constructed runners and s, or flow gates, if the article is likely to sink, for you cannot it well.

PANNING CASTINGS.—Clean them well from the sand, then dip in or paint them over with good boiled linseed oil: when rately dry, heat them in an oven to such a temperature as turn the oil black, without burning. The stove should not be iot at first, and the heat should be gradually raised to avoid ring; the slower the change in the oil is effected the better be the result. The castings, if smooth at first, will receive a black and polished surface by this method.

NCERNING SAWS, RAILWAY SPRINGS, &C.—When the saws are ed to be rather hard, but little of the oil tempering composition page 176) is burned off; when milder, a large portion; and spring temper the whole is allowed to burn away. Saws as as springs appear to lose their elasticity, after hardening and ering, from the reduction they undergo in grinding and po- ig. Towards the conclusion of the manufacture, the elasticity e saw is restored principally by hammering, and partly over ar coke fire to a straw color; the tint is removed by very di- l muriatic acid, after which the saws are well washed in plain r and dried. Spring manufacture includes the heaviest speci- s of hardened steel works uncombined with iron; for example, springs for all kinds of vehicles, some intended for railway measure 3½ feet long, and weigh 50 lbs. each piece; two of are used in combination; other single springs are 6 feet long, weigh 70 lbs. The principle of these bow-springs will be im- ately seen by conceiving the common archery bow fixed hori- ally with its cord upwards; the body of the carriage being at- ed to the cord sways both perpendicularly and sideways with ct freedom. In hardening them they are heated by being n backwards and forwards through an ordinary fire built w, and they are immersed in a trough of plain water. In tem- g them they are heated until the black red is just visible at night; by daylight the heat is denoted by its making a piece of wood sparkle when rubbed on the spring, which is then allowed to cool in the air. The metal is nine-sixteenths of an inch thick, and some consider five-eigths the limits to which steel will harden properly, that is sufficiently alike to serve as a spring. Their elasticity is tested far beyond their intended range.

On Rubber Goods.—As many parties require to use rubber goods who are entirely ignorant of the cheap mixtures which are vended in large quantities, at enormous profits by manufacturers, I have thought proper in this place to irradiate the subject with a little "light" for the benefit of those whom "it may concern," and accordingly present the formulæ for compounding the different mixtures which enter into the composition of many articles sold quite extensively as *pure rubber* goods, but which, owing to large adulterations, in many cases cost 75 per cent. less than the prices charged for them. The first I shall present is for:

Light Buffer Springs.—Grind together clear Java rubber, 25 lbs.; Para rubber, 5 lbs.; common magnesia, 10 lbs.; pure sulphur 25 ozs.; This is brown at first, but in a few days turns grey or white, and just sinks in water. Springs made from this compound, 4½ x 2½ x 1, pressed to half an inch, showed 3½ tons on the dial.

Grey Packing for Marine Engines &c.—Grind together cleaned Java rubber, 5 lbs.; Para rubber, 25 lbs.; oxide of zinc, 16 lbs.; carbonate of magnesia, 6 lbs.; Porcelain or Cornwall clay, 3 lbs.; red lead, 2 lbs.; pure sulphur, 30 ozs. It may be proper to state that good purified Java rubber might be substituted by engineers with good effect for Para rubber in the above and some other compositions.

Rag Packing for Valves, Bearing Springs &c.—This is made principally from the useless cuttings in the manufacture of India rubber coats, when the gum is run or spread on calico foundations. Proportions as follows: grind together useless scraps, 35 lbs.; blacklead 18 lbs.; Java gum, 16 lbs.; yellow sulphur, 1 lb.

Composition for Suction Hose for Fire Engines, &c.—Grind together Java rubber, 20 lbs.; Para do, 10 lbs.; white lead, 14 lbs.; red lead, 14 lbs.; yellow sulphur, 1½ lbs. This is spread upon flax cloth which weighs 10, 16, and 32 ozs. to the square yard.

Common Black Packing.—Grind together, Java rubber, 15 lbs.; Para do., 15 lbs.; oxide of zinc, 15 lbs.; China or Cornwall clay, 15 lbs.; yellow sulphur, 28 ozs.

Common white Buffer Rings, &c.—Grind together Java rubber, 30 lbs.; oxide of zinc, 18 lbs.; carbonate of magnesia, 6 lbs.; clean chalk or whiting, 6 lbs.; flour of sulphur, 2 lbs.

Vulcanite, or Ebonite.—If the amount of sulphur added to the prepared rubber amounts to 10 per cent. and the operation of vulcanizing is performed in close vessels, at a temperature exceeding 300, or the heat required for Vulcanizing India Rubber as described under that head, which see, an article will be produced known as *vulcanite, or ebonite.* It is a black, hard, elastic substance, resembling horn in its texture and appearance, and capable of taking a very high polish. It is of great use in the arts, and is largely manufactured for making combs, door handles and hundreds ticles hitherto made in ivory or bone. Its electrical properties are very great.

st Pure Spring, or Washers.—Grind together Para gum, 30 oxide of zinc, 5 lbs.; carb. magnesia, 2 lbs.; common chalk, s.; Porcelain or Cornwall clay, 2 lbs.; pure sulphur, 30 oz.

mpanion Quality to above.—Para rubber, 30 lbs.; oxide of 5 lbs.; Porcelain or Cornwall clay, 5 lbs.; pure sulphur, .

Iypo" Cloth for Waterproof Coats.—Grind together clean gum, 30 lbs.; lamp black, 5 lbs.; dry chalk or whiting, 11 sulphuret of lead, 5 lbs. This composition is applied to rproof garments.

mpering Locomotive Tires.—This is quite ponderous work, as ires of the eight foot wheels weigh about 10 cwt. and consist of t one-third steel. The materials for the tires are first swaged se- tely, and then welded together under the heavy hammer at the works, after which they are bent to the circle, welded, and ed to certain gauges. The tire is now heated to redness in a cir- furnace; during the time it is getting hot, the iron wheel, iously turned to the right diameter, is bolted down upon a plate, the tire expands with the heat, and when at a cherry red, dropped over the wheel, for which it was previously too small, is also hastily bolted down to the surface plate. The whole is quickly immersed by a swing crane into a tank of water t five feet deep, and hauled up and down until nearly cold; teel tires are not afterwards tempered. The spokes are forged of flat-bars with T formed heads, these are arranged radially e founder's mould whilst the cast-iron centre is poured around , the ends of the T heads are then welded together to consti- the periphery of the wheel or inner tire, and little wedge-form s are inserted where there is any deficiency of iron. The wheel en chucked on a lathe, bored and turned on the edge, not cy- ically, but like the meeting of two cones, and about one ter of an inch higher in the middle than the two edges. The pound tire is turned to the corresponding form, and conse- tly, larger within or under cut, so that the shrinking secures tire without the possibility of obliquity or derangement, and ivets are required. It sometimes happens that the tire breaks rinking when by mismanagement the diameter of the wheel excess.

nufacturing and Repairing Anvils.—The common anvil is lly made of seven pieces: 1, the core, or body; 2, 3, 4, 5, the corner pieces, which serve to enlarge its base; 6, the project- end, which has a square hole for the reception of the tail or k of a chisel on which iron bars may be cut through, and 7, beak, or horizontal cone, round which rods or slips of metal be turned in a circular form, as in making rings. These pieces are welded separately to the first or core, and then ham- ed into a uniform body. In manufacturing large anvils two ths are needed, in order to bring each of the two pieces to be led to a proper heat by itself, and several men are employed in king them together briskly in the welding state, by heavy g hammers. The steel facing is applied by welding in the same manner, powdered borax with sal ammoniac (1 part to 10 parts of borax) being used as a flux. The anvil is then heated to a cherry red, and plunged into cold water, a running stream being better than a pool or cistern, the rapid formation of steam at the sides of the metal preventing the free access of the water for the removal of the heat with the required expedition. In some cases a stream of water is contrived to descend from a cistern above on the part to be chilled, which is sure to render it very hard. The facing should not be too thick a plate, for when such, it is apt to crack in the hardening. It is somewhat dangerous to stand near such works at the time, as when the anvil face is not perfectly welded, it sometimes, in part, flies off with great violence and a loud report. In the case of broken anvils the repairs will have to be made in accordance with the above description. In finishing off the face, it is smoothed upon a grindstone, and, for fine work, polished with emery and crocus.

HARDENING AXLETREES AND BOXES.—The method now used in the manufacture of Murphy's axletrees is to use wrought iron and weld two pieces of steel into the lower side, where they rest upon the wheels and sustain the load. The work is heated in an open forge fire, in the ordinary way, and when it is removed, a mixture, principally prussiate of potash is laid upon the steel; the axletree is then immediately immersed in water, and additional water is allowed to fall upon it from a cistern. The steel is considered to be very materially hardened by the treatment, and the iron around the same is also partially hardened. One very good way to chill *axletree* boxes is to mould from wooden patterns on sand, and cast them upon an iron core which has the effect of making them very hard. To form the annular recess for oil, a ring of sand, made in an appropriate core-box, is slipped upon the iron mandril, and is left behind when the latter is driven out of the casting.

TO PURIFY ZINC.—Pure zinc may be obtained by precipitating its sulphate by an alkali, mixing the oxide thus produced with charcoal powder, and exposing the mixture to a bright red heat in a covered crucible in whch the pure metal will be found as a button at the bottom when cold.

TO GALVANIZE CAST-IRON THROUGH AND THROUGH.—To 50 lbs. melted iron add 1 lb. pulverized zinc, chemically pure. Directions, scatter the zinc powder well over the ladle, then catch the iron and pour at once. It is better, just before pouring, to stir the iron well, in order that a more complete union of the metals may take place.

TO CHILL CAST IRON VERY HARD.—Use a liquid made as follows: soft water, 10 gallons; salt, 1 peck; oil vitriol, ½ pt; saltpetre, ½ lb.; prussiate of potash, ¼ lb.; cyanide of potash, ½ lb. Heat the iron a cherry red and dip as usual, and if wanted harder repeat the process.

ANOTHER TO HARDEN CAST IRON.—Salt, 2 lbs.; saltpetre, ½ lb.; roche alum, ½ lb.; ammonia, 4 ozs. salts of tartar, 4 ozs.; pulverize all together and incorporate throughly, use by powdering all over the iron while it is hot, then plunging it in cold water.

TO MAKE BORAX.—Alum, 2 ozs.; dilute with water; and mix with 2 ozs. potash, boil in a pot half an hour over a gentle fire, take it the water, add 2 ozs. gem salt in powder, as much of alkal- lbs. honey, and 1 of cow's milk, mix all together, set it sun for 3 days and the borax is ready for use. This will go as far in a blacksmith's shop as common borax.

LDING CAST STEEL.—Silver sand 2 lbs. plaster of Paris, 1 lb.; ioroughly. Heat your article and dust it with the above, place he fire again until you get a red heat and it will weld.

PIRATOR.—An excellent respirator may be made of a thick of carded cotton wool placed between two pieces of muslin. ialled for arresting dust, steel particles &c.

ALING STEEL.—For small pieces of steel, take a piece of gas or 3 inches in diameter, and put the pieces in it, first heat- ie end of the pipe, and drawing it together, leaving the other pen to look into. When the pieces are of a cherry red, cover e with saw dust, use a charcoal fire, and leave the steel in over

RILL HARDENED STEEL.—Cover your steel with melted beeswax; coated and cold make a hole in the wax with a fine pointed nee- r other article the size of hole you require, put a drop of strong acid upon it, after an hour rinse off, and apply again, it will ially eat through.

PREVENT IRON RUSTING.—Give it a coat of linseed oil and ng, mixed together in the form of a paste. It is easily removed vill preserve iron from rusting for years.

CAST BRASS SOLID.—The metal should not be run any hotter is necessary to insure sharp castings. The most probable cause honey combings of castings is that the air cannot get out way; and there ought to be proper vents made for it from ighest parts of the mould; the metal should be run in near the bottom of the mould. If about 1 lb. of lead be added to eve- lbs. of old brass, when just at the melting point, solid good bras- ill be the result. In melting old brass, the zinc, or lead, con- d in it (when fluid) oxidizes freely, consequently the propor- of the metal are altered, and require an addition similar to bove. If the brass has not been re-cast a little less lead will ut if re-cast several times it may take the full quantity.

RECOVER THE TIN FROM OLD BRITANNIA.—Melt the metal, and hot sprinkle sulphur over it; and stir it up for a short time, burns the other metals out of the tin, which may then be used ny purpose desired.

UE FOR LABELLING ON METALS.—Boiling water, 1 qt.; pulver- borax, 2 ozs.; gum shellac, 4 ozs. Boil till dissolved. Used for hing labels to metals, or it will do to write inscriptions with, dust or dab on a little bronze powder over it, varnishing over ronze.

SSIA SHEET IRON.—Russia sheet iron is, in the first instance, y pure article, rendered exceedingly tough and flexible by ing and annealing. Its bright, glossy surface is partially a te, and partially an oxide of iron, and is produced by passing iot sheet, moistened with a solution of wood-ashes, through hard steel rollers

MPOSITE IRON RAILINGS.—The process by which this light, nt and cheap fabric is manufactured, is as follows:—Rods and bars of wrought-iron are cut to the lengths desired for the pattern, and subjected to a process called crimping, by which they are bent to the desired shape. These rods are then laid in the form of the design, and cast-iron moulds are affixed at those points where a connection is desired; the moulds are then filled with melted metal, and immediately you have a complete railing of beautiful design. Casting in iron moulds has this great advantage over the old sand moulding, it does not require any time for cooling, as the metal is no sooner run than the moulds may be removed and used again immediately on another section of the work; and, besides, it is so much more easily effected. By the combination of wrought and cast-iron in this process, the most curious and complex designs may be produced with great rapidity and cheapness.

Von Bibra's Alloy for Medals.—Bismuth, 27.27 parts; lead, 59.09 parts; tin, 13.64 parts. If the cast objects be bitten with dilute nitric acid, washed with water, and rubbed with a woollen rag, the elevated spots become bright while the sunken portions are dull, and the casting acquires a dark gray appearance, with an antique lustre. Without biting, the color is light-gray.

New Sheathing Metal.—This alloy is made by melting 2½ parts of copper in one crucible, in another 9 parts of zinc, 87 of lead, 1 part of mercury, and ½ part of bismuth, then mixing the contents of both crucibles, covering the surface with charcoal dust, and stirring well till all are incorporated. It is stated that the mercury in this alloy protects both the zinc and copper from the action of sea-water. The contents of the crucible are run into ingots, and rolled into sheets.

Iron Tube Manufacture.—In the present method of manufacturing the patent welded tube, the end of the skelp is bent to the circular form, its entire length is raised to the welding heat in an appropriate furnace, and, as it leaves the furnace almost at the point of the fusion, it is dragged by the chain of a draw-bench, after the manner of wire, through a pair of tongs with two bell-shaped jaws; these are opened at the time of introducing the end of a skelp, which is welded without the agency of a mandril. By this ingenious arrangement wrought iron tubes may be made from the diameter of 6 inches internally and about 1-8 to 3-8 of an inch thick, to as small as 1-4 of an inch diameter and 1-10 bore, and so admirably is the joining effected in those of the best description that they will withstand the greatest pressure of water, steam or gas to which they have been subjected, and they admit of being bent both in the heated and cold state, almost with impunity. Sometimes the tubes are made one upon the other when great thickness is required; but those stout pipes, and those larger than 3 inches, are but seldom required. The wrought iron tubes of hydrostatic presses, which measure about ½ an inch internally, and ¼ to 3-8 of an inch thick in the metal, are frequently subjected to a pressure of *four tons* on each square inch.

Brass Tubes.—Brass or other tubes are formed of rolled metal which is cut to the desired width by means of revolving discs; in the large sizes of tubes, the metal is partially curved in its length by means of a pair of rolls, when in this condition it is passed through a steel hole or a die, a plug being held in such a position as allows the metal to pass between it and the interior of the hole. Oil is used to lubricate the metal, the motion is communicated by power, the drawing apparatus being a pair of huge nippers, which holds the brass, and is attached to a chain and revolves round a windlass or cylinder. The tube in its unsoldered state is annealed, bound round at intervals of a few inches with iron wire, and solder and borax applied along the seam. The operation of soldering is completed by passing the tube through an air stove, heated with "cokes" or "breezes" which melts the solder, and unites the two eyes of the metal, and forms a perfect tube; it is then immersed in a solution of sulphuric acid, to remove scaly deposits on its surface, the wire and extra solder having been previously removed: it is then drawn through a "finishing hole plate" when the tube is completed.

Mandril drawn tubes are drawn upon a very accurately turned steel mandril, by this means the internal diameter is rendered smooth. The tubes drawn by this process are well adapted for telescopes, syringes, small pump cylinders, &c. The brass tubes for the boilers of locomotive engines are now made by casting and drawing without being soldered, and some of them are drawn taper in their thickness. Tubes from 1-10 inch internal diameter and 8 or ten inches long, up to those of two or three inches diameter and 4 or 5 feet long, are drawn vertically by means of a strong chain wound on a barrel by wheels and pinions, as in crane. In Donkin's tube drawing machine, which is applicable to making tubes, or rather cylinders, for paper-making and other machinery, as large as 26½ inches diameter, and 6½ feet long, a vertical screw is used, the nut of which is turned round by toothed wheels driven by six men at a windlass.

The fluted tubes of pencil cases are drawn through ornamental plates, with elevations and depressions corresponding to the impressions left on the tube.

Damascus Twist and Stub-Twist Gun-Barrels.—The twisted barrels are made out of long ribbands of iron, wound spirally around a mandril, and welded on their edges by jumping them on the ground, or rather on an anvil embedded therein. The plain stub barrels are made in this manner, from iron manufactured from a bundle of stub-nails, welded together, and drawn out into ribbands, to insure the possession of a material most thoroughly and intimately worked. The Damascus barrels are made from a mixture of stub-nails and clippings of steel in given proportions, puddled together, made into a bloom, and subsequently passed through all the stages of the manufacture of iron, in order to obtain an iron that shall be of an unequal quality and hardness, and therefore display different colors and markings when oxidized or browned. Other twisted barrels are made in the like manner, except that the bars to form the ribbands are twisted whilst red hot, like ropes, some to the right, others to the left, and which are sometimes laminated together for greater diversity. They are subsequently again drawn into the ribbands and wound upon the mandril, and frequently two or three differently prepared pieces are placed side by side to form the complex and ornamental figures for the barrels of fowling-pieces, described as ***stub-twist***, ***wire-twist***, ***Damascus-twist***, &c. Sometimes Damascus gun-barrels are formed by arranging twenty-five thin bars of iron and mild steel in alternate layers, welding the whole together, drawing it down small, twisting it like a rope, and again welding three such ropes, for the formation of the ribband, which is then spirally twisted to form a barrel, that exhibits, when finished and acted upon by acids, a diversified, laminated appearance, resembling, when properly managed, an ostrich feather.

MANUFACTURING CHAINS.—For this purpose the iron is cut off with a plain chamfer, as from the annular form of the links their extremities cannot slide asunder when struck. Every succeeding link is bent, introduced, and finally welded. In some of these welded chains the links are no more than ½ an inch long, and the iron wire ⅛ inch diameter. These are made with great dexterity by a man and a boy, at a small fire. The curbed chains are welded in the ordinary way and twisted afterwards, a few links being made red-hot at a time for the purpose. The massive cable chains are made much in the same manner, although partly by aid of machinery. The bar of iron, now one, one and a half, or even two inches in diameter, is heated, and the scarf is made as a plain chamfer, by a cutting machine; the link is then formed by inserting the edge of the heated bar within a loop in the edge of an oval disk, which may be compared to a chuck fixed on the end of a lathe mandril. The disk is put in gear by the steam engine; it makes exactly one revolution and throws itself out of motion. This bends the heated extremity of the iron into an oval figure. Afterwards it is detached from the rod with a chamfered cut by the cutting machine, which, at one stroke, makes the second scarf of the detached link, and the first of that next to be curled up. The link is now threaded to the extremity of the chain, closed together and transferred to the fire, the loose end being carried by a traverse crane. When the link is at the proper heat, it is returned to the anvil, welded, and dressed off between top and bottom tools, after which the cast iron transverse stay is inserted, and the link having been closed upon the stay, the routine is recommenced. The work commonly requires three men, and the scarf is placed at the side of the oval link, and flat way through the same. In similar chains made by hand it is, perhaps, more customary to weld the link at the *crown*, or small end.

BUTTON MANUFACTURE.—Metal buttons are formed of an inferior kind of brass, pewter, or other metallic compositions. For button metal, see a variety of alloys on pages 191 and 193. Buttons with shanks are usually made of these compositions, which is supplied to the manufacturers in sheets of the required thickness. By means of fly presses and punches, circular disks called *blanks*, are cut out of these sheets. This is mostly performed by females, who can furnish about 30 blanks per minute, or 12 gross per hour. Hand punching is the general mode of cutting out blanks, but more complicated machines, which cut out 8 or 10 blanks at a time, are in use. After being punched, the edges of the blanks are very sharp, and require to be smoothed and rounded. Their surfaces are then planished on the face by placing them separately in a die under a small stamp, and allowing them to receive a smart blow from a polished steel hammer. In this state they are ready to receive the shanks or small metal loops by which they are attached to the dress. They are made by a machine in which a coil of wire is gradually advanced towards a pair of shears which cuts off short pieces. A metal finger then presses against the middle of each piece, first bending it and then pressing it into a vice, when it is compressed so as to form a loop; a hammer then strikes the two ends, spreading them into a flat surface, and the shank is pushed out of the machine ready for use. The shanks are attached to the blanks by women, with iron wire, solder and rosin. They are then put into an oven, and, when firmly united, form plain buttons. If a crest or inscription is wanted, it is placed in a die and stamped. Buttons are gilded by gold amalgam, by being put into an earthen pan with the proper quantity of gold to cover them, amalgamated with mercury in the following manner: the gold is put into an iron ladle in thin strips, and a small quantity of mercury, say 1 part of mercury to 8 of gold, added to it, the ladle is held over the fire till the gold and mercury are perfectly united. This amalgam being put into the pan with the buttons, as much aquafortis, diluted with water, as will wet them all over, is thrown in, and they are stirred up with a brush till the acid, by its affinity to the copper in the buttons, carries the amalgam to every part of their surface, giving it the appearance of silver; this done, the acid is washed away with clean water. This is called the *quicking* process. In *drying off*, the pan of buttons is heated by a charcoal fire expelling the mercury in the form of a vapor, which, under the improved system, is conducted into an oblong iron flue or gallery, gently sloped downwards, having at its end a small vertical tube dipped into a water cistern, for condensing the mercury, and a large vertical pipe for promoting the draught of the products of the combustion. The gold thus deposited in an exceedingly thin film upon the buttons, presents a dull yellow color, and must now be burnished; this is effected by a piece of hematites, or bloodstone, fixed on a handle and applied to the button, as it revolves in the lathe.

Cutlery Manufacture.—There are three kinds of steel employed in manufacture of different articles of cutlery, common steel, shear steel, and cast steel. All edge tools which require to be tenacious without being very hard, are made of shear steel. The best scissors, razors, penknives, &c., are made from cast steel, which is able to take a very fine polish, common steel is only used in making cheap articles of cutlery. In making good table-knives, shear steel and cast steel are generally preferred. In the ordinary method of making knives, the blades are cut out of a sheet of steel, and the backs, shoulders and tangs of wrought iron, are attached to the steel blades by welding at the forge. The knife is then ground to the proper shape, and the blade polished and hardened. The fork manufacture is a distinct branch of industry, and the manufacturers of table knives generally buy their forks from the fork makers ready to be put into their handles. In making table knives, two men are generally employed; one is called the foreman, or maker, and the other the striker. Penknives are usually forged by a single hand, with hammer and anvil simply; they are hardened by heating the blades red-hot, and dipping them into water up to the shoulder. Razors are also hardened in the same manner. The grinding and polishing of cutlery are generally performed by machinery, the business of the grinders is divided into grinding, glazing and polishing. Grinding is performed upon stones of various dimensions. Those articles which require temper being ground on wet stones. Glazing is a process by which lustre is given to cutlery; it is performed with a glazier, consisting of a circular piece of wood, sometimes covered with leather, or an alloy of lead and tin; it is fixed on an axis like a grindstone. The polishing process is the last, and is performed on a similar piece of wood covered with buff leather. Only articles of cast steel which have been hardened and tempered are subjected to this operation.

DAMASKEENING.—This is the art, now in a great measure lost, of producing a watered or wavy appearance on steel sword-blades, armour, &c., or of inlaying and encrusting steel with gold and silver, originally practised at Damascus. Various methods of damaskeening were practised, but the most common seem to have been those of welding two different kinds of steel, or steel and iron, together, or of cutting lines on the surface of the steel and filling them with gold or silver, which was either forced into the incised lines and brought to a level with the surface of the steel, or remained in relief above it. When the former method was used, a light pattern, generally in many lines, was produced on a dark ground, or *vice versa*, and the junction of the metals caused the pattern to run through the entire thickness of the blade, so that it could not be obliterated even by grinding.

DIE SINKING. When a die is required for a coin or medals, the engraver takes a piece of soft steel of suitable dimensions, generally 3 or 4 inches in length, and about an inch greater in diameter than the coin or other article required, on this he hollows out the exact form of the desired impression by cutting away the steel by degrees, with small, well-tempered, case-hardened tools. As soon as this work is thoroughly accomplished the steel is hardened by being heated red-hot in a crucible with charcoal and oil or bone-dust, and then plunged into cold water. When a great number of coins of one sort are required, the original die is termed the matrix, and copies are made from it by taking impressions from it in soft steel, which is in relief, and is called the puncheon, and from which, when it has been hardened, other dies are produced by pressure exactly similar to the matrix, and in *intaglio*, which are case-hardened in their turn before they are fit to transmit an impression to any metal used for money. The metal used for our coinage, whether gold, silver, copper, or bronze is stamped in a cold and solid state; but medals and casts can also be produced by a method called casting *en cliché*, in which the metal is used in a soft state. For this purpose an alloy is used, consisting of ¼ lead, ¼ tin, and ½ bismuth, which fuses readily at the boiling point, 212° Fah. When the metal is soft, resembling paste in consistency, the die is placed upon it, and the impression produced by a smart blow from a mallet; the surface of the metal sets instantly, from coming into contact with the cold die, and thus readily retains the form that has been given to it. Copies of medals may be readily made in this way, but each face will be obtained in a separate piece, and these must be joined to give representations of the coin in a complete form. Onamental work is produced in thin metal for gasfitting, cornices, parts of cruet-stands, trays, &c., by means of a pair of dies, on one of which the pattern is formed in relief, and on the other in *intaglio*, the metal being placed between them, and brought into the desired shape by pressure. Dies are also made in metal for forming articles in gutta-percha and leather, and producing embossed figures on the cloth covers of books, as well as on cardboard, paper, &c.

STEELPLATE ENGRAVING. As regards steelplate engraving it has proved immensely superior to the old copperplate system. A soft steelplate is first engraved with the required subject in the most finished style of art, either by hand or mechanically, or the two combined, and the plate is then hardened; a softened steel cylinder is then rolled over the hardened plate, with great pressure by powerful machinery, until the engraved impression appears in relief,—the hollow lines of the original becoming ridges upon the cylinder, the roller is re-converted to the condition of ordinary steel, and hardened, after which it serves for returning the impression to any number of decarbonized plates, every one of which becomes absolutely a *counterpart* of the original, and every plate, when hardened, would yield the enormous number of 150,000 impressions, without any perceptible difference between the first and the last. In one instance, from one engraving of the Queen's head on the postage stamp, over 6000 plates were produced from the original, and plates for bank-note printing are multiplied in the same way. Great caution must be used in the various processes of annealing and hardening, as only slight carelessness would result in ruining the most costly plates. The method in use in the bank of England is as follows: the work to be hardened is enclosed in a wrought-iron box with a loose cover, a false bottom, and with three ears projecting from its surface about midway; the steel is surrounded on all sides with carbon from leather, driven in hard, and the cover and bottom are carefully luted with moist clay, thus prepared, the case is placed in the vertical position, in a bridge fixed across a great tub, which is then filled with water almost to touch the flat bottom of the case; the latter is now heated in the furnace as quickly as will allow the uniform penetration of the heat. When sufficiently hot, it is removed to its place in the hardening tub, the cover of the iron box is removed, and the neck or gudgeon of the cylinder is grasped, *beneath the surface of the carbon*, with a long pair of tongs, upon which a couplet is dropped to secure the grasp. It only remains for the individual to hold the tongs with a glove whilst a smart tap of the hammer is given to their extremity; this knocks out the false bottom of the case and the cylinder, and the tongs prevent the cylinder from falling on its side, and thus injuring its delicate but still hot surface. For square plates, a suitable frame is attached by four slight claws, and it is the frame which is seized by the tongs; the latter are sometimes held by a chain which removes the risk of accident to the individual. The steel comes out of the water as smooth to the touch as at first, and mottled with all the beautiful tints of case-hardened gun-locks.

ON FILE MANUFACTURE.—Files are made of bars of steel, rendered doubly hard by a process called *double conversion*, drawn the required size at the tilt hammer, and then shaped, the square and flat ones by the hammer and common anvil only, but those of round, half-round, and three-angled forms, by means of bosses and dies made in the above shapes, which fit into a groove left for them in the anvil. The steel blanks having been thus formed, are next *annealed*, or softened, to render them capable of being cut, by placing a number of them together in a brick oven, rendered air-tight by filling up all the interstices with sand (to prevent the oxidation of the steel, to which it is very liable, if air be admitted), and then making a fire play as equally as possible all round until they are red hot, when the heat is discontinued, and the steel allowed to cool gradually before it is uncovered. The surface to contain the teeth is now rendered as smooth as possible by grinding or filling; the teeth are then cut with a carefully ground chisel, each incision being made separately. The next and last process, that of hardening, is performed in various ways by different makers, the ordinary method, however, is to cover the files with a kind of composition or protecting varnish to prevent oxidation and scalding of the steel when heated; and, lastly, they are plunged in cold, fresh water to cool them as quickly as possible. Some file-makers coat their files, before tempering, with a composition of cow-dung or pig-flour, which not only protects the sharp angles of the cuttings from the action of the fire, but furnish a highly azotized substance, which conduces greatly to still further harden and steelify the finished work. I know several file manufacturers who make use of a bath of melted lead for tempering purposes. The files are first coated with a greasy composition to prevent any oxide adhering, then introduced for a short time into melted lead, or the "metallic bath" as it is called, and then plunged into the tempering liquid. The melted lead may be kept covered with charcoal, or other suitable ingredient, to prevent oxidation. In some manufactories a charcoal fire is kept burning on the surface of the melted lead.

PEN MAKING.—Pens should be made of the best steel that can be got, as peculiar elasticity is required in them, which could not be obtained if poor steel were used. The steel is cut into slips some 3 feet long and 4 inches broad; these slips are then plunged into a pickle of diluted sulphuric acid so as to remove the scales from the surface; next it is passed between heavy rollers by which it is reduced to the thickness required, and made fit to undergo the first process in pen making. This is performed by a girl, who, seated at a stamping-press provided with a bed and corresponding punch, speedily cuts out the blank, which is perfectly flat. The next step is to perforate the hole which terminates the slit, and to remove any superfluous steel which might interfere with the elasticity of the pen. The embryo pens are then annealed in a muffle, and the maker's name stamped upon them. The pens are next transferred to another class of workmen, who, by means of a press, either make the pens concave, if they are merely to be nibs, or, if they are to be barrel pens, they roll the barrel together. The next process is termed the *hardening*, and consists in placing a number of pens in an iron box which is introduced into a muffle. After they become of a deep red heat they are plunged into a tank of oil, and, when they get cool, the adhering oil is removed by agitation in circular tin barrels; *tempering* is the next step, by heating to the necessary elasticity in a warm bath of oil; and, finally, the whole number of pens are placed in a revolving cylinder along with sand, ground crucible, and other cutting substances, which tends to brighten them up to the natural color of the steel; next the nib is ground down finely, with great rapidity, by a girl, who picks it up with a pair of pliers, and, with a single touch on an emery revolving wheel, perfects it at once. The slit is now made by means of a press. A chisil, or wedge, with a flat side, is affixed to the bed of the press, and the descending screw has a corresponding chisel-cutter, which passing down with the greatest accuracy on the pen, which had been placed on the chisel affixed to the bed, and the slit is made and the pen complete. They are next colored brown or blue, by placing them in a revolving metal cylinder, under which is a charcoal stove, and, by watching narrowly the different gradation of color, the requisite tint is speedily attained; a brilliant polish is subsequently imparted by immersing the pens in lac dissolved in naptha; they are then dried, counted, selected and placed in boxes for sale.

GOLD PENS.—Gold pens are made much in the same manner as steel, with this important difference, that, as they cannot be tempered in the same way that steel is, the necessary elasticity is imparted to them by hammering, and by rubbing them with a small hard stone and water, instead of the tempering, &c., in oil. As gold is too soft of itself to make a durable pen, it is found necessary to attach a minute portion of an alloy of iridium and osmium, by soldering to the tips. This makes an extremely hard and durable point.

ON NEEDLE MANUFACTURE, TEMPERING, &c.—This small but important implement has to go through the hands of about 120 workmen during the process of manufacture. The steel wire, being drawn to the proper size, is submitted to various tests to ascertain its quality, and is then cut into proper lengths by shears, which, by striking 21 blows in a minute, cut in 10 hours fully 400,000 ends of steel wire, which produce about 800,000 needles. These are passed on for further manipulation to other workmen, who straighten and point the pieces of wire. After pointing they are cut in two, so as to form two separate needles of equal length and quality. For each different size a small copper plate is employed. It is nearly square, and has a turned-up edge on two of its sides, the one is intended to receive all the points, while the other resists the pressure of the shears. On this plate a certain number of wire are put with their points in contact with the border, and they are cut together flush with the plate, by means of a small pair of shears moved by the knee of the workman. These even wires are now taken to the *head flattener*. This workman, seated over a table with a block of steel before him about 3 inches cube, takes up from 20 to 25 needles between his finger and thumb, spreading them out like a fan, with the points under the thumb, he lays the heads on the steel block, and, with a small flat-faced hammer strikes a few successive blows upon them

so as to flatten them in an instant. The heads, having become hardened by hammering, are now annealed by heating and slow cooling, and are handed to the *piercer*, generally a child, who forms the eye in a second by laying the head upon a block of steel, and by driving a small punch through one side with a smart tap of the hammer, and then exactly opposite on the other. The eyes are then trimmed by driving the punch through them again on a lump of lead and, after laying the needle with the punch sticking through it, upon the block of steel, hammering the head on the sides, which causes it to take the form of the punch. The next operator makes the groove at the eye and rounds the head, which he does with a small file. The needles, being thus prepared, are thrown by the workmen pell-mell into a sort of drum or box, in which they are made to arrange themselves in parallel lines by means of a few dexterous shakes of the workman's arm. They are now ready to be tempered, for which purpose they are ranged on sheet-iron plates, about 30 lbs. weight at a time, containing from 250,000 to 500,000 needles, and are placed in a proper furnace, when they are heated to a bright redness for the larger needles, and to a less intense degree for the smaller; they are then removed, and inverted suddenly over a bath of cold water in such a way that all the needles may be immersed at the same time, yet separate from each other. This has the effect of making them very hard and brittle. The water being run off, the needles are removed for further operations. Some manufacturers heat the needles by means of immersion in melted lead, others throw them into a pan along with a quantity of grease, which, being placed on the fire, the oily matter soon ignites, and after it burns out, the needles are found to be in the proper temper; those which are twisted in the tempering being afterwards straightened by the hammer on the anvil.

Polishing is the next and most expensive and prolonged operation. This is effected on bundles containing 500,000 needles intermixed with quartzoze sand, and a little rape-seed oil. Thirty of those bundles are exposed to the vibratory pressure of wooden tables, which make about 20 horizontal double movements per minute, causing the bundles to run over 2 feet each time, or 800 feet per hour. This agitation is kept up about 18 or 20 hours, causing such a movement and attrition as to polish the needles in the bags or bundles. They are then removed from the packets into wooden bowls and mixed with sawdust to remove the grease and other impurities, placed in a cask, which is turned by a winch; more sawdust is introduced as required, and the turning is continued until the needles become clean and bright. They are then winnowed by a fan to clean them from the sawdust and refuse matter, and are subsequently arranged in regular order on a small, somewhat concave, iron tray. The operation of making up the rolls or bags, polishing, winnowing and arranging them, have to be repeated ten times on the best needles. It is found that emery powder mixed with quartz and mica or pounded granite is preferable to anything else for polishing needles by friction in the bags at the first, emery mixed with olive oil, from the second to the seventh operation, putty, or oxide of tin for the eight and ninth, putty with very little

oil for the tenth, and lastly bran to give a finish. In this mode of operating, the needles are scoured in a copper cask studded in the interior with raised points to increase the friction and a quantity of hot soap suds is introduced occasionally to keep them clean. The cask must be slowly turned upon its axis for fear of injuring the mass of needles it contains. They are finally dried in the wooden cask by attrition with saw dust, then wiped with a linen rag or soft leather—the damaged ones being thrown aside. The *sorting* is performed in dry appartments, where all the points are first laid the same way, and the needles arranged in the order of their polish with great rapidity. The workman places 2000 or 3000 needles in an iron ring two inches in diameter, and sets all their heads in one plane, then, on looking carefully at their points, he easily recognizes the broken ones and removes them with an instrument adapted for the purpose. These defective needles pass into the hands of the *pointer* in order to be ground again, when they form articles of inferior value. Those needles bent in the polishing must now be straightened, and the whole are finally arranged by the tact of the finger and thumb of the sorter, and weighed out into quantities for packing into blue papers. The *bluer* puts the final touch to them by taking 25 needles at a time between his fore-finger and thumb, and pressing their points against a small hone-stone of compact micaceous schist, quadrangular in form, mounted in a small lathe, turning them briskly round, giving the points a bluish cast, while he polishes and improves them.

Balance Springs of Chronometers.—The balance springs of marine chronometers, which are in the form of a screw, are wound into the square thread of a screw of the appropriate diameter and coarseness; the two ends of the spring are retained by side screws, and the whole is carefully enveloped in platinum foil, and lightly bound with wire. The mass is next heated in a piece of gun barrel closed at one end, and plunged into oil, which hardens the spring almost without discolouring it, owing to the exclusion of the air by the close platinum covering, which is now removed, and the spring is let down to the blue before removal from the screwed block. The balance or hair spring of *common* watches are frequently left soft, those of the *best* watches are hardened in the coil upon a plain cylinder and are then curled into the spiral form between the edge of a blunt knife and the thumb, the same as in curling up a narrow ribbon or paper, or the filaments of an ostrich feather. The soft springs are worth 60 cents each, those hardened and tempered $1.26 each. This raises the value of the steel, originally less than 4 cents, to $2000 and $8000 respectively. It takes 3200 balance springs to weigh an ounce.

Watch Spring Manufacture.—Watch springs are hammered out of round steel wire, of suitable diameter until they fill the gauge, for width. which at the same time insures equality of thickness. The holes are punched in their extremities, and they are trimmed on the edge with a smooth file. The springs are then tied up with binding wire, in a loose *open* coil and heated over a charcoal fire upon a perforated revolving plate. They are hardened in oil and blazed off. The spring is now distended in a long metal frame, similar to that used for a saw blade, and ground and polished with emery and oil between lead blocks. By this time its elasticity appears quite lost, and it may be bent in any direction; its elasticity is, however, entirely restored by a subsequent hammering on a very bright anvil which puts the "*nature into the spring.*" The coloring is done over a flat plate of iron, or hood, under which a small spirit lamp is kept burning; the spring is continually drawn backward and forward, about two or three inches at a time, until it assumes the orange or deep blue tint throughout, according to the taste of the purchaser. By many the coloring is considered to be a matter of ornament and not essential. The last process is to coil the spring into the spiral form, that it may enter the barrel in which it is to be contained. This is done by a tool with a small axis and winch handles, and does not require heat.

COMPENSATION BALANCE OF CHRONOMETERS.—The balance is a small piece of steel covered with a hoop of brass. The rim, consisting of the two metals, is divided at the two extremities the one diametrical arm of the balance, so that the increase of temperature which weakens the balance springs contract, in a proportionate degree, the diameter of the balance, leaving the spring less resistance to overcome. This occurs from the brass expanding much more by heat than steel, and it therfore curls the semicircular arcs inwards, an action that will be immediately understood, if we conceive the compound bar of steel to be straight, as the heat would render the brass side longer and convex, and in the balance it renders it more curved. In the compensation balance the two metals are united as follows: the disk of steel when turned and pierced with a central hole is fixed by a little screw-bolt and nut at the bottom of a small crucible, with a central elevation smaller than the disk; the brass is now melted and the whole allowed to cool. The crucible is broken. the excess of brass is turned off in the lathe, the arms are made with the file as usual, the rim is tapped to receive the compensation screws or weights, and, lastly, the hoop is divided in two places at the opposite ends of its diametrical arm.

TABULAR VIEW OF THE PROCESSES OF SOLDERING.—*Hard soldering.* The hard solders most commonly used are the spelter solders. and silver solders. The general flux is borax, marked A, on the table, and the modes of heating are the naked fire, the furnace or muffle, and the blow pipe, marked *a*, *b*, *g*, applicable to nearly all metals less fusible than the solders; the modes of treatment are nearly similar throughout. *Note.*—The examples commence with the solders (the least fusible first) followed by the metals for which they are commonly employed. Fine gold, laminated and cut into shreds, is used as the solder for joining chemical vessels made of platinum. Silver is by many considered as much the best solder for German silver, for silver solders, see pages 153 and 154. Copper cut in shreds, is sometimes similarly used for iron Gold solders laminated are used for gold alloys, see 153 and 154. Spelter solders, granulated whilst hot, are used for iron, copper, brass, gun metals, German silver, &c, see 189. Silver solders, laminated are employed for all silver works and for common gold work, also for German silver, gilding metal, iron, steel, brass, gun metal, &c., when greater neatness is required than is obtained from spelter solder.

White or button solders, granulated, are employed for the white alloys called button metals; they were introduced as cheap substitutes for silver solder.

Hard Soldering. Applicable to nearly all the metals; the modes of treatment are very different. The soft solder mostly used is 2 parts tin and one of lead; sometimes, from motives of economy, much more lead is employed, and 1½ tin to 1 lead is the most fusible of the group, unless bismuth is used. The fluxes B to G, and the modes of heating *a* to *i*, are all used with the soft solders.

Note.—The examples commence with the metals to be soldered. Thus in the list zinc, 8, *c*, *f*, implies, that zinc is soldered with No. 8 alloy, by the aid of the muriate or chloride of zinc, and the copper bit. Lead, 4 to 8, F, *d*, *e*, implies that lead is soldered with alloys varying from No. 4 to 8, and that it is fluxed with tallow, the heat being applied by pouring on melted solder, and the subsequent use of the heated iron, not tinned; but in general one only of the modes of heating is selected, according to circumstances.

Iron, cast-iron and steel, 8, B, D, if thick, heated by *a*, *b*, or *c*, and also by *g*. See page 190.

Tinned iron, 8, C, D, *f*.

Gold and silver are soldered with pure tin, or else with 8, E, *a*, *g*, or *h*.

Copper and many of its alloys, namely, brass, gilding metal gun metal. &c., 8, B, C, D; when thick, heated by *a*, *b*, *c*, *e*, or *g*, when thin by *f*, or *g*.

Speculum metal, 8, B, C, D, the heat should be cautiously applied, the sand bath is perhaps the best mode.

Zinc, 8, C. *f*.

Lead and lead pipes, or ordinary plumber's work 4 to 8 F, *d*, or *e*.

Lead and tin pipes, 8, D, and G, mixed, *g*, and also *f*.

Britannia metal, C, D, *g*. See page 189.

Pewters, the solders must vary in fusibility according to the fusibity of the metal, generally G, and *i*, are used. sometimes also G, and *g*, or *f*.

Lead is united without solder by pouring on red-hot lead, and employing a red-hot iron *d*, *e*.

Iron and brass are sometimes burned, or united by partial fusion, by pouring very hot metal over or around them. See page 214.

ALLOYS AND THEIR MELTING HEATS.

No. 1	1	Tin	25	Lead	558	Fahr.
2	1	“	10	“	541	“
3	1	“	5	“	511	“
4	1	“	3	“	482	“
5	1	“	2	“	441	“
6	1	“	1	“	370	“
7	1½	“	1	“	334	“
8	2	“	1	“	340	“
9	3	“	1	“	356	“
10	4	“	1	“	365	“
11	5	“	1	“	378	“
12	6	“	1	“	381	“

FLUXES.

A. Borax.
B. Sal-am. or mur. of amm.
C. Muriate or chlor. of zinc.
D. Common resin.
E. Venice turpentine.
F. Tallow.
G. Gallipoli oil, or common [sweet oil.

MODES OF APPLYING HEAT.

a. Naked fire.
b. Hollow furnace or muffle.
c. Immersion in melted sold.

fowling-pieces, described as *stub-twist, wire-twist, Damascus-twist*, &c. Sometimes Damascus gun-barrels are formed by arranging twenty-five thin bars of iron and mild steel in alternate layers, welding the whole together, drawing it down small, twisting it like a rope, and again welding three such ropes, for the formation of the ribband, which is then spirally twisted to form a barrel, that exhibits, when finished and acted upon by acids, a diversified, laminated appearance, resembling, when properly managed, an ostrich feather.

MANUFACTURING CHAINS.—For this purpose the iron is cut off with a plain chamfer, as from the annular form of the links their extremities cannot slide asunder when struck. Every succeeding link is bent, introduced, and finally welded. In some of these welded chains the links are no more than ½ an inch long, and the iron wire ⅛ inch diameter. These are made with great dexterity by a man and a boy, at a small fire. The curbed chains are welded in the ordinary way and twisted afterwards, a few links being made red-hot at a time for the purpose. The massive cable chains are made much in the same manner, although partly by aid of machinery. The bar of iron, now one, one and a half, or even two inches in diameter, is heated, and the scarf is made as a plain chamfer, by a cutting machine; the link is then formed by inserting the edge of the heated bar within a loop in the edge of an oval disk, which may be compared to a chuck fixed on the end of a lathe mandril. The disk is put in gear by the steam engine; it makes exactly one revolution and throws itself out of motion. This bends the heated extremity of the iron into an oval figure. Afterwards it is detached from the rod with a chamfered cut by the cutting machine, which, at one stroke, makes the second scarf of the detached link, and the first of that next to be curled up. The link is now threaded to the extremity of the chain, closed together and transferred to the fire, the loose end being carried by a traverse crane. When the link is at the proper heat, it is returned to the anvil, welded, and dressed off between top and bottom tools, after which the cast iron transverse stay is inserted, and the link having been closed upon the stay, the routine is recommenced. The work commonly requires three men, and the scarf is placed at the side of the oval link, and flat way through the same. In similar chains made by hand it is, perhaps, more customary to weld the link at the *crown*, or small end.

BUTTON MANUFACTURE.—Metal buttons are formed of an inferior kind of brass, pewter, or other metallic compositions. For button metal, see a variety of alloys on pages 191 and 193. Buttons with shanks are usually made of these compositions, which is supplied to the manufacturers in sheets of the required thickness. By means of fly presses and punches, circular disks called *blanks*, are cut out of these sheets. This is mostly performed by females, who can furnish about 30 blanks per minute, or 12 gross per hour. Hand punching is the general mode of cutting out blanks, but more complicated machines, which cut out 8 or 10 blanks at a time, are in use. After being punched, the edges of the blanks are very sharp, and require to be smoothed and rounded. Their surfaces are then planished on the face by placing them separately in a die under a small stamp, and allowing them to receive a smart blow from a polished steel hammer. In this state they are ready to receive the shanks or small metal loops by which they are attached to the dress. They are made by a machine in which a coil of wire is gradually advanced towards a pair of shears which cuts off short pieces. A metal finger then presses against the middle of each piece, first bending it and then pressing it into a vice, when it is compressed so as to form a loop; a hammer then strikes the two ends, spreading them into a flat surface, and the shank is pushed out of the machine ready for use. The shanks are attached to the blanks by women, with iron wire, solder and rosin. They are then put into an oven, and, when firmly united, form plain buttons. If a crest or inscription is wanted, it is placed in a die and stamped. Buttons are gilded by gold amalgam, by being put into an earthen pan with the proper quantity of gold to cover them, amalgamated with mercury in the following manner: the gold is put into an iron ladle in thin strips, and a small quantity of mercury, say 1 part of mercury to 8 of gold, added to it, the ladle is held over the fire till the gold and mercury are perfectly united. This amalgam being put into the pan with the buttons, as much aquafortis, diluted with water, as will wet them all over, is thrown in, and they are stirred up with a brush till the acid, by its affinity to the copper in the buttons, carries the amalgam to every part of their surface, giving it the appearance of silver; this done, the acid is washed away with clean water. This is called the *quicking* process. In *drying off*, the pan of buttons is heated by a charcoal fire expelling the mercury in the form of a vapor, which, under the improved system, is conducted into an oblong iron flue or gallery, gently sloped downwards, having at its end a small vertical tube dipped into a water cistern, for condensing the mercury, and a large vertical pipe for promoting the draught of the products of the combustion. The gold thus deposited in an exceedingly thin film upon the buttons, presents a dull yellow color, and must now be burnished; this is effected by a piece of hematites, or bloodstone, fixed on a handle and applied to the button, as it revolves in the lathe.

Cutlery Manufacture.—There are three kinds of steel employed in manufacture of different articles of cutlery, common steel, shear steel, and cast steel. All edge tools which require to be tenacious without being very hard, are made of shear steel. The best scissors, razors, penknives, &c., are made from cast steel, which is able to take a very fine polish, common steel is only used in making cheap articles of cutlery. In making good table-knives, shear steel and cast steel are generally preferred. In the ordinary method of making knives, the blades are cut out of a sheet of steel, and the backs, shoulders and tangs of wrought iron, are attached to the steel blades by welding at the forge. The knife is then ground to the proper shape, and the blade polished and hardened. The fork manufacture is a distinct branch of industry, and the manufacturers of table knives generally buy their forks from the fork makers ready to be put into their handles. In making table knives, two men are generally employed; one is called the foreman, or maker, and the other the striker. Penknives are usually forged by a single hand, with hammer and anvil simply; they are hardened by heating the blades red-hot, and dipping them into water up to the shoulder. Razors are also hardened in the same manner. The grinding and polishing of cutlery are generally performed by machinery, the business of the grinders is divided into grinding, glazing and polishing. Grinding is performed upon stones of various dimensions. Those articles which require temper being ground on wet stones. Glazing is a process by which lustre is given to cutlery; it is performed with a glazier, consisting of a circular piece of wood, sometimes covered with leather, or an alloy of lead and tin; it is fixed on an axis like a grindstone. The polishing process is the last, and is performed on a similar piece of wood covered with buff leather. Only articles of cast steel which have been hardened and tempered are subjected to this operation.

DAMASKEENING.—This is the art, now in a great measure lost, of producing a watered or wavy appearance on steel sword-blades, armour, &c., or of inlaying and encrusting steel with gold and silver, originally practised at Damascus. Various methods of damaskeening were practised, but the most common seem to have been those of welding two different kinds of steel, or steel and iron, together, or of cutting lines on the surface of the steel and filling them with gold or silver, which was either forced into the incised lines and brought to a level with the surface of the steel, or remained in relief above it. When the former method was used, a light pattern, generally in many lines, was produced on a dark ground, or *vice versa*, and the junction of the metals caused the pattern to run through the entire thickness of the blade, so that it could not be obliterated even by grinding.

DIE SINKING. When a die is required for a coin or medals, the engraver takes a piece of soft steel of suitable dimensions, generally 3 or 4 inches in length, and about an inch greater in diameter than the coin or other article required, on this he hollows out the exact form of the desired impression by cutting away the steel by degrees, with small, well-tempered, case-hardened tools. As soon as this work is thoroughly accomplished the steel is hardened by being heated red-hot in a crucible with charcoal and oil or bone-dust, and then plunged into cold water. When a great number of coins of one sort are required, the original die is termed the matrix, and copies are made from it by taking impressions from it in soft steel, which is in relief, and is called the puncheon, and from which, when it has been hardened, other dies are produced by pressure exactly similar to the matrix, and in *intaglio*, which are case-hardened in their turn before they are fit to transmit an impression to any metal used for money. The metal used for our coinage, whether gold, silver, copper, or bronze is stamped in a cold and solid state; but medals and casts can also be produced by a method called casting *en cliché*, in which the metal is used in a soft state. For this purpose an alloy is used, consisting of ¼ lead, ¼ tin, and ½ bismuth, which fuses readily at the boiling point, 212° Fah. When the metal is soft, resembling paste in consistency, the die is placed upon it, and the impression produced by a smart blow from a mallet; the surface of the metal sets instantly, from coming into contact with the cold die, and thus readily retains the form that has been given to it. Copies of medals may be readily made in this way, but each face will be obtained in a separate piece, and these must be joined to give representations of the coin in a complete form. Onamental work is produced in thin metal for gasfitting, cornices, parts of cruet-stands, trays, &c., by means of a pair of dies,on one of which the pattern is formed in relief, and on the other in *intaglio*, the metal being placed between them, and brought into the desired shape by pressure. Dies are also made in metal for forming articles in gutta-percha and leather, and producing embossed figures on the cloth covers of books, as well as on card-board, paper, &c.

STEELPLATE ENGRAVING. As regards steelplate engraving it has proved immensely superior to the old copperplate system. A soft steelplate is first engraved with the required subject in the most finished style of art, either by hand or mechanically, or the two combined, and the plate is then hardened; a softened steel cylinder is then rolled over the hardened plate, with great pressure by powerful machinery, until the engraved impression appears in relief,—the hollow lines of the original becoming ridges upon the cylinder, the roller is re-converted to the condition of ordinary steel, and hardened, after which it serves for returning the impression to any number of decarbonized plates, every one of which becomes absolutely a *counterpart* of the original, and every plate, when hardened, would yield the enormous number of 150,000 impressions, without any perceptible difference between the first and the last. In one instance, from one engraving of the Queen's head on the postage stamp, over 6000 plates were produced from the original, and plates for bank-note printing are multiplied in the same way. Great caution must be used in the various processes of annealing and hardening, as only slight carelessness would result in ruining the most costly plates. The method in use in the bank of England is as follows: the work to be hardened is enclosed in a wrought-iron box with a loose cover, a false bottom, and with three ears projecting from its surface about midway; the steel is surrounded on all sides with carbon from leather, driven in hard, and the cover and bottom are carefully luted with moist clay, thus prepared, the case is placed in the vertical position, in a bridge fixed across a great tub, which is then filled with water almost to touch the flat bottom of the case; the latter is now heated in the furnace as quickly as will allow the uniform penetration of the heat. When sufficiently hot, it is removed to its place in the hardening tub, the cover of the iron box is removed, and the neck or gudgeon of the cylinder is grasped, *beneath the surface of the carbon*, with a long pair of tongs, upon which a couplet is dropped to secure the grasp. It only remains for the individual to hold the tongs with a glove whilst a smart tap of the hammer is given to their extremity; this knocks out the false bottom of the case and the cylinder, and the tongs prevent the cylinder from falling on its side, and thus injuring its delicate but still hot surface. For square plates, a suitable frame is attached by four slight claws, and it is the frame which is seized by the tongs; the latter are sometimes held by a chain which removes the risk of accident to the individual. The steel comes out of the water as smooth to the touch as at first, and mottled with all the beautiful tints of case-hardened gun-locks.

ON FILE MANUFACTURE.—Files are made of bars of steel, rendered doubly hard by a process called *double conversion*, drawn the required size at the tilt hammer, and then shaped, the square and flat ones by the hammer and common anvil only, but those of round, half-round, and three-angled forms, by means of bosses and dies made in the above shapes, which fit into a groove left for them in the anvil. The steel blanks having been thus formed, are next *annealed*, or softened, to render them capable of being cut, by placing a number of them together in a brick oven, rendered air-tight by filling up all the interstices with sand (to prevent the oxidation of the steel, to which it is very liable, if air be admitted), and then making a fire play as equally as possible all round until they are red hot, when the heat is discontinued, and the steel allowed to cool gradually before it is uncovered. The surface to contain the teeth is now rendered as smooth as possible by grinding or filling; the teeth are then cut with a carefully ground chisel, each incision being made separately. The next and last process, that of hardening, is performed in various ways by different makers, the ordinary method, however, is to cover the files with a kind of composition or protecting varnish to prevent oxidation and scalding of the steel when heated; and, lastly, they are plunged in cold, fresh water to cool them as quickly as possible. Some file-makers coat their files, before tempering, with a composition of cow-dung or pig-flour, which not only protects the sharp angles of the cuttings from the action of the fire, but furnish a highly azotized substance, which conduces greatly to still further harden and steelify the finished work. I know several file manufacturers who make use of a bath of melted lead for tempering purposes. The files are first coated with a greasy composition to prevent any oxide adhering, then introduced for a short time into melted lead, or the "metallic bath" as it is called, and then plunged into the tempering liquid. The melted lead may be kept covered with charcoal, or other suitable ingredient, to prevent oxidation. In some manufactories a charcoal fire is kept burning on the surface of the melted lead.

PEN MAKING.—Pens should be made of the best steel that can be got, as peculiar elasticity is required in them, which could not be obtained if poor steel were used. The steel is cut into slips some 3 feet long and 4 inches broad; these slips are then plunged into a pickle of diluted sulphuric acid so as to remove the scales from the surface; next it is passed between heavy rollers by which it is reduced to the thickness required, and made fit to undergo the first process in pen making. This is performed by a girl, who, seated at a stamping-press provided with a bed and corresponding punch, speedily cuts out the blank, which is perfectly flat. The next step is to perforate the hole which terminates the slit, and to remove any superfluous steel which might interfere with the elasticity of the pen. The embryo pens are then annealed in a muffle, and the maker's name stamped upon them. The pens are next transferred to another class of workmen, who, by means of a press, either make the pens concave, if they are merely to be nibs, or, if they are to be barrel pens, they roll the barrel together. The next process is

. the *hardening*, and consists in placing a number of pens in ı box which is introduced into a muffle. After they become ep red heat they are plunged into a tank of oil, and, when et cool, the adhering oil is removed by agitation in circular rels ; *tempering* is the next step, by heating to the necessary ity in a warm bath of oil; and, finally, the whole number of e placed in a revolving cylinder along with sand, ground cru- nd other cutting substances, which tends to brighten them up natural color of the steel; next the nib is ground down finely, reat rapidity, by a girl, who picks it up with a pair of pliers, ith a single touch on an emery revolving wheel, perfects it at The slit is now made by means of a press. A chisil, or wedge, flat side, is affixed to the bed of the press, and the descend- ew has a corresponding chisel-cutter, which passing down e greatest accuracy on the pen, which had been placed on sel affixed to the bed, and the slit is made and the pen com- They are next colored brown or blue, by placing them in a ing metal cylinder, under which is a charcoal stove, and, by ng narrowly the different gradation of color, the requisite speedily attained; a brilliant polish is subsequently imparted ersing the pens in lac dissolved in naptha; they are then counted, selected and placed in boxes for sale.

PENS.—Gold pens are made much in the same manner as vith this important difference, that, as they cannot be tem- in the same way that steel is, the necessary elasticity is ed to them by hammering, and by rubbing them with a hard stone and water, instead of the tempering, &c., in oil. d is too soft of itself to make a durable pen, it is found ary to attach a minute portion of an alloy of iridium and n, by soldering to the tips. This makes an extremely hard rable point.

NEEDLE MANUFACTURE, TEMPERING, &c.—This small but im- t implement has to go through the hands of about 120 en during the process of manufacture. The steel wire, being to the proper size, is submitted to various tests to ascertain lity, and is then cut into proper lengths by shears, which, by g 21 blows in a minute, cut in 10 hours fully 400,000 ends of ire, which produce about 800,000 needles. These are passed further manipulation to other workmen, who straighten and he pieces of wire. After pointing they are cut in two, so as to wo separate needles of equal length and quality. For each dif- size a small copper plate is employed. It is nearly square, and urned-up edge on two of its sides, the one is intended to re- ll the points, while the other resists the pressure of the shears. s plate a certain number of wire are put with their points in t with the border, and they are cut together flush with the by means of a small pair of shears moved by the knee of the an. These even wires are now taken to the *head flattener*. orkman, seated over a table with a block of steel before him 3 inches cube, takes up from 20 to 25 needles between his and thumb, spreading them out like a fan, with the points the thumb, he lays the heads on the steel block, and, with a lat-faced hammer strikes a few successive blows upon them

so as to flatten them in an instant. The heads, having become hardened by hammering, are now annealed by heating and slow cooling, and are handed to the *piercer*, generally a child, who forms the eye in a second by laying the head upon a block of steel, and by driving a small punch through one side with a smart tap of the hammer, and then exactly opposite on the other. The eyes are then trimmed by driving the punch through them again on a lump of lead and, after laying the needle with the punch sticking through it, upon the block of steel, hammering the head on the sides, which causes it to take the form of the punch. The next operator makes the groove at the eye and rounds the head, which he does with a small file. The needles, being thus prepared, are thrown by the workmen pell-mell into a sort of drum or box, in which they are made to arrange themselves in parallel lines by means of a few dexterous shakes of the workman's arm. They are now ready to be tempered, for which purpose they are ranged on sheet-iron plates, about 30 lbs. weight at a time, containing from 250,000 to 500,000 needles, and are placed in a proper furnace, when they are heated to a bright redness for the larger needles, and to a less intense degree for the smaller; they are then removed, and inverted suddenly over a bath of cold water in such a way that all the needles may be immersed at the same time, yet separate from each other. This has the effect of making them very hard and brittle. The water being run off, the needles are removed for further operations. Some manufacturers heat the needles by means of immersion in melted lead, others throw them into a pan along with a quantity of grease, which, being placed on the fire, the oily matter soon ignites, and after it burns out, the needles are found to be in the proper temper; those which are twisted in the tempering being afterwards straightened by the hammer on the anvil.

Polishing is the next and most expensive and prolonged operation. This is effected on bundles containing 500,000 needles intermixed with quartzoze sand, and a little rape-seed oil. Thirty of those bundles are exposed to the vibratory pressure of wooden tables, which make about 20 horizontal double movements per minute, causing the bundles to run over 2 feet each time, or 800 feet per hour. This agitation is kept up about 18 or 20 hours, causing such a movement and attrition as to polish the needles in the bags or bundles. They are then removed from the packets into wooden bowls and mixed with sawdust to remove the grease and other impurities, placed in a cask, which is turned by a winch; more sawdust is introduced as required, and the turning is continued until the needles become clean and bright. They are then winnowed by a fan to clean them from the sawdust and refuse matter, and are subsequently arranged in regular order on a small, somewhat concave, iron tray. The operation of making up the rolls or bags, polishing, winnowing and arranging them, have to be repeated ten times on the best needles. It is found that emery powder mixed with quartz and mica or pounded granite is preferable to anything else for polishing needles by friction in the bags at the first, emery mixed with olive oil, from the second to the seventh operation, putty, or oxide of tin for the eight and ninth, putty with very little

r the tenth, and lastly bran to give a finish. In this mode of oper- g, the needles are scoured in a copper cask studded in the inte- with raised points to increase the friction and a quantity of hot uds is introduced occasionally to keep them clean. The must be slowly turned upon its axis for fear of injuring the of needles it contains. They are finally dried in the wooden by attrition with saw dust, then wiped with a linen rag or leather—the damaged ones being thrown aside. The *sorting* rformed in dry appartments, where all the points are first laid ame way, and the needles arranged in the order of their polish great rapidity. The workman places 2000 or 3000 needles iron ring two inches in diameter, and sets all their heads in lane, then, on looking carefully at their points, he easily re- izes the broken ones and removes them with an instrument ted for the purpose. These defective needles pass into the s of the *pointer* in order to be ground again, when they form les of inferior value. Those needles bent in the polishing must be straightened, and the whole are finally arranged by the of the finger and thumb of the sorter, and weighed out into tities for packing into blue papers. The *bluer* puts the final h to them by taking 25 needles at a time between his fore-finger thumb, and pressing their points against a small hone-stone mpact micaceous schist, quadrangular in form, mounted in a l lathe, turning them briskly round, giving the points a bluish while he polishes and improves them.

LANCE SPRINGS OF CHRONOMETERS.—The balance springs of ne chronometers, which are in the form of a screw, are wound the square thread of a screw of the appropriate diameter and eness; the two ends of the spring are retained by side screws, and whole is carefully enveloped in platinum foil, and lightly bound wire. The mass is next heated in a piece of gun barrel closed e end, and plunged into oil, which hardens the spring almost out discolouring it, owing to the exclusion of the air by the platinum covering, which is now removed, and the spring is own to the blue before removal from the screwed block. The nce or hair spring of *common* watches are frequently left soft, of the *best* watches are hardened in the coil upon a plain cy- r and are then curled into the spiral form between the edge blunt knife and the thumb, the same as in curling up a nar- ribbon or paper, or the filaments of an ostrich feather. The springs are worth 60 cents each, those hardened and tempered each. This raises the value of the steel, originally less than ts, to $2000 and $8000 respectively. It takes 3200 balance gs to weigh an ounce.

ATCH SPRING MANUFACTURE.—Watch springs are hammered f round steel wire, of suitable diameter until they fill the gauge, idth, which at the same time insures equality of thickness. holes are punched in their extremities, and they are trimmed e edge with a smooth file. The springs are then tied up with ng wire, in a loose *open* coil and heated over a charcoal fire a perforated revolving plate. They are hardened in oil and bla- ff. The spring is now distended in a long metal frame, similar to sed for a saw blade, and ground and polished with emery and

ALLOYS AND THEIR MELTING HEATS.					MODES OF APPLYING HEAT.
13	4 Lead	4 Tin	1 Bismuth	320 Fahr	*d*. Melted solder or metal poured on.
14	3 "	3 "	1 "	310 "	*e*. Heated iron, not tin'd.
15	2 "	2 "	1 "	292 "	*f*. Heated copper tool, tinned.
16	1 "	1 "	1 "	254 "	*g*. Blow pipe flame.
17	2 "	1 "	2 "	236 "	*h*. Flame alone, generally alcohol.
18	3 "	5 "	2 "	202 "	*i*. Stream of heated air.

TO REFINE SWEEPINGS CONTAINING GOLD OR SILVER.—To 8 ozs. of the dirt, which has been washed and burnt, add salt, 4 ozs.; pearlash 4 ozs.; red tartar 1 oz.; saltpetre ½ oz., mix thoroughly in a mortar, melt in a crucible, and dissolve out the precious metals in a button.

TO FUSE GOLD DUST.—Use such a crucible as is generally used for melting brass; heat very hot; then add your gold dust mixed with powdered borax;—after some time a scum or slag will arise on the top, which may be thickened by the addition of a little lime or bone ash. If the dust contains any of the more oxidizeable metals, add a little nitre, skim off the slag or scum very carefully; when melted grasp the crucible with strong iron tongs; and pour off immediately into cast iron moulds, slightly greased. The slag and crucibles may be afterwards pulverized, and the auriferous matter recovered from the mass through cupellation by means of lead.

TO RECOVER GOLD FROM QUARTZ.—Pulverize the quartz rock as usual, and fuse the mass with lime and oxide of iron. When fused, immerse thin plates of wrought iron in the mixture. The plates soon become coated with a thin film of gold, and are then withdrawn and immersed in a bath of melted lead, which removes the adhering gold, when the plates can be at once returned to the fused quartz and the operation repeated as frequently as the case may require. Another method, when the metal is disseminated through quartz pyrites or lead, is to pulverize the ore as usual and wash the whole with a stream of water, which carries away the lighter portions of sand, leaving the heavy metal behind. It is further freed from impurities by being amalgamated with quick-silver, which is afterwards distilled off. In this state it generally contains from 2 to 10 per cent. of silver or tellurium. It is further refined by being finely granulated and boiled with concentrated sulphuric acid until every other constituent is boiled out. Gold by being alloyed, loses much of its ductility and malleability, but gains in fusibility and hardness. Gold alloys are assayed in two ways, first, by rubbing the article on a touchstone (which is a velvety, black flinty variety of jasper) so as to make a metallic streak, which is touched with *aqua regia*, and the effect is compared with that of a similar streak made by an alloy of known composition. By this means an experienced operator can estimate the amount of alloy in any mixture correctly within one per cent. Full information regarding the second process can be seen under the article on REFINING GOLD AND SILVER.

GOLD ALLOYS. The "New Standard" for watch cases, &c., is 18 carats of fine gold and 6 of alloy. No gold of inferior quality can receive the "Hall mark"; and gold of lower quality is generally described by its commercial value. The alloy may be entirely silver, which will give a green color, or entirely copper for a red color, but the copper and silver are more usually mixed in one alloy according to the taste of the jeweller. It will be understood that these are all made with fine gold, fine silver, and fine copper, direct from the refiner. Gold of 22 carats fine being so little used, is intentionally omitted. 1. *Gold of* 18 *carats, of yellow tint.* Gold 15 dwt, silver, 2 dwt, 18 grs, copper, 2 dwt 6 grs, 2. *Gold of* 18 *carats, red tint.* Gold 15 dwt, silver, 1 dwt 18 grs, copper, 3 dwt 6 grs. 3, *Spring gold of* 16 *carats.* Gold 1 oz. 16 dwt, silver, 6 dwt. copper, 12 dwt. This, when drawn or rolled very hard, makes springs little inferior to steel; 4 *Jewellers' Fine Gold, yellow tint,* 16 *carats nearly.* Gold, 1 oz. silver, 7 dwt. copper, 5 dwt, 5. *Gold of red tint,* 16 *carats.* Gold, 1 oz. silver, 2 dwt. copper, 8 dwt. Gold alloys in great variety will be found by consulting the "Jewellers' Department" pages 153, 154, 155 and 156.

SMELTING OF COPPER.—After the ore is raised from the mine, it is freed from its matrix and sorted, the purest portions being broken into pieces the size of a nut. The first calcination is effected in a reverberatory furnace, the heat not being raised too high. At the end of 12 hours the ore is converted into a black powder, containing sulphide of copper, oxide and sulphide of iron, and earthy impurities. The roasted ore is next fused with a quantity of silicious slag, by which means it is converted into a fusible slag consisting of silicate of iron and sulphides of iron and copper, which sink through the slag, forming at the bottom a heavy mass, termed a *matt.* The matt thus procured is, while melted, run into water, by which it is granulated. The product obtained is called *coarse metal.* It is roasted once more for twenty-four hours, by which means the larger proportion of the sulphide of iron is converted into oxide. It is then calcined with some copper ore known to contain oxide of copper and silica. The oxide of copper transforms any remaining sulphide of iron into oxide, which is taken up by the silica to form a slag, through which the sulphide of copper sinks. This matt contains about 80 per cent. of copper, and is known by the name of *fine metal.* It is cast into pigs, the lower portions of which contain most of the impurities; the metal extracted from the upper portions being known in the market as best selected copper. The fine metal has now to be freed entirely from sulphur by a final calcination, at a heat just short of that required to fuse it. During the process the metal becomes oxidized at the surface. The oxide thus formed decomposes the rest of the sulphide, sulphurous acid escaping, and metallic copper remaining behind. The metal obtained is run off into moulds, forming ingots full of bubbles, from the escape of the sulphurous acid gas. These ingots, which are known as *pimple,* or blistered copper, from their peculiar appearance, have now to undergo the process of refining. They are placed in a reverberatory furnace, and kept in a melted state for upwards of 20 hours, to oxidize the last traces of foreign metals. Slags are formed on the surface and skimmed off, and a great deal of oxide is produced which is absorbed by the metal. To reduce this oxide, the surface of the melted metal is covered with anthracite or charcoal, and towards the last a young tree is thrust in. This process, which is called poling, disengages the whole of the oxygen from the oxide diffused through the mass. The above is, as nearly as possible, the method of copper-smelting, as employed in England, the processes adopted in Saxony and North America being nearly identical with it, the difference merely being modifications to suit the various impurities contained in the ore. When the ore consists of oxide or carbonate of copper only, it is reduced to the metallic state by simple fusion with charcoal and subsequent poling.

Smelting of Lead.—The ore having been brought to the surface, is first sorted by hand, the purest portions being set aside ready for smelting. The rest is broken by hammers into lumps as large as a walnut, and again sorted. The remainder is then crushed in a mill, and sifted through coarse sieves, the coarser portions being set aside for the stampers, and the finer being subjected to the process of *jigging*. This consists in plunging a sieve containing the ore into water, and shaking it dexterously, so that the smallest particles pass through, leaving the larger pieces in the sieve, with the lightest and least metallic portions uppermost. If the sorted galena be tolerably free from gangue, about 1½ ton of the ore is mixed with 1-15th to 1-40th its weight of lime, and heated to dull redness in a reverberatory furnace, through which a current of air is passing. By this means a large portion of the sulphur is burnt off as sulphurous acid, oxide of lead and sulphate of lead being formed, and much of the ore remaining undecomposed. When the roasting has been carried sufficiently far, the furnace doors are shut and the heat is raised. The sulphate and oxide of lead re-act on the undecomposed sulphide, a large quantity of sulphurous acid is formed, which passes off, leaving large quantities of metallic lead behind. The fire is now damped, and a quantity of lime thrown in, which forms a very infusible slag, allowing the metallic lead to be drawn off into moulds. The slag, which contains a large proportion of lead, is smelted with an additional portion of ore. Lead is refined by being melted in a shallow pan in a reverberatory furnace. By this operation any tin or antimony it may contain is oxidized and removed as skimmings. When a ladleful of the lead under this operation cools with a peculiar crystalline surface, the process is discontinued, and the metal is run off into pigs. For some purposes, such for instance as the making of red lead for the manufacture of flint glass, it is necessary that the lead should be almost chemically pure, as a proportion of copper for instance, amounting only to a few grains per ton, would color the glass and spoil the batch. Silver may be profitably extracted from lead, even when it contains only three or four ounces to the ton, by Pattinson's process. This process depends upon the fact that, as lead solidifies, the first portions that crystallize are pure lead. The operation is, therefore, performed by melting the metal in an iron pot and allowing it to cool gradually; as it cools, the crystals of pure lead are removed by a perforated ladle, and the process continually repeated with fresh portions of lead until the mass contains about 300 ounces to the ton. It is then submitted to *cupellation*. See REFINING GOLD AND SILVER, page 164.

MANUFACTURE OF IRON.—The preparation of the ore is effected in a very simple manner, either by pounding or levigating, to separate the clay and silica, or other impurities, or by roasting, to draw off sulphur and carbonic acid, and to render the ore more easily crushed. The extraction of the metal from the ore was formerly effected by means of charcoal, in what was termed a Catalan forge, but it is only used now in a few instances. On account of the loss of metal during the process, it will be better to describe the usual method of smelting ores in England by the blast-furnace. A blast-furnace consists of a long cone inverted upon a shorter cone, at the bottom of which is a vertical passage called the crucible, into which are inserted three pipes called tuyères, through which the blast is conveyed; also a larger opening, through which the slag may be withdrawn, at intervals. At the bottom is a hole called the tap-hole, usually closed with clay for drawing off the reduced metal when a sufficient quantity is collected. The furnace is fed with coal, limestone and ore, from a hole near the top, the charge being renewed from time to time as the materials burn down. The action by which the ore is reduced to the metallic state may be traced as follows. The oxygen of the air of the blast combines with the carbon of the coal to form carbonic acid during the process of combustion. The carbonic acid, during its passage through the rest of the heated fuel, is decomposed, being converted into carbonic oxide. The carbonic oxide, still ascending, meets with the hydrogen and coal-gas, together with which it forms a reducing mixture, abstracting the oxygen of the ore and setting free the iron in a metallic state, which sinks down to the bottom of the furnace, where it comes in contact with the carbon of the coal. With this carbide of iron is formed, increasing the fusibility of the reduced iron to such an extent that the lime, clay, and silica present, which have been converted into a fusible slag, float on the top as an imperfect glass. The slag runs over through the side apertures provided for the purpose, and the metal is withdrawn every 12 or 24 hours through the tap-hole. It is run into moulds consisting of a long channel, from each side of which run shorter ones. The central channel is known as the *sow*, the side ones as the *pigs*, hence the term *pig iron*, as applied to rough cast-iron. Great improvements have lately been made in the process of smelting iron, by the introduction of a heated blast for urging the combustion, and by using the combustible gases issuing from the top of the furnace for heating the blast, or the boilers of the steam-engines used for the blowing machines. These improvements are now in use at most of the principal iron works throughout the kingdom, and an idea of their importance may be gathered from the fact that 15 years ago a yield of 200 tons per furnace was thought to be a large quantity, whereas now, at the Ulverstone and other works, 600 and 650 tons per week is thought an ordinary yield; not only this, but the amount of fuel used has been reduced to one-quarter by the same means. The iron that comes from the furnace is generally much too impure to be used for any but the very roughest castings, it therefore has to be remelted, to drive off, as much as possible, the uncombined carbon, or graphite, silicon, phosphorus, sulphur, and other impurities. A single refusion converts it into what is termed "No. 2 pig," or a grey iron, a fusible and liquid metal; a second and third still further purifying it from carbon, until it is converted into refined or white iron, in which the whole of the carbon is combined with the metal. This description of cast-iron is only used for conversion into malleable iron, for although it melts easily, it forms a much more pasty mass than some of the intermediate qualities of grey iron, which melt into a more liquid metal, fitting them for casting purposes. Refined iron made from the German spathose ores contains a large quantity of combined carbon and manganese, and crystallizes in large plates. It is termed *spiegel-eisen*, or *mirror iron*, from the brilliancy of its crystalline structure, and is much valued for making steel. Founders are accustomed to divide cast-iron into three or four qualities. No. 1, pig or black cast-iron, which contains a large proportion of uncombined carbon; No. 2, or grey cast-iron, which contains more combined carbon; No. 3, or mottled, which contains only a few grains of uncombined carbon, here and there, giving it a mottled appearance; No. 4, or refined iron, in which the whole of the carbon is combined. No. 4, is very hard and brittle, and is fit for puddling or conversion into malleable or wrought-iron. This is effected by bringing an ingot of refined iron to a state of fusion in a reverberatory furnace, taking care to avoid the contact of fuel. The heat is continued until the ingot parts with its carbon, which is assisted by throwing on it scales of oxide, if produced in the forge. As the carbon burns off, the ingot becomes more and more pasty, until at length it is converted into a granular sandy mass. The heat is now raised until it becomes very intense, and the air is excluded by closing the damper and doors. The metal begins to agglomerate into round masses, or blooms, which the puddler collects on the end of an iron rod, and subjects, while still hot, either to the action of a hammer or to a powerful press, called a sloughing press, which squeezes out the slag and other impurities, and forces the particles of iron closer together. The iron is then rolled into bars, and forms what is called homogeneous iron, a quality of metal much used when great hardness is required. It is distinguished by its granular texture when notched and broken. It is much used for the tops of railway bars, and for the wearing surfaces of railway wheels. Where the fibrous quality of iron is required, it is cut into lengths, after the first process of rolling, then piled longitudinally, heated in a reverberatory furnace, and hammered out. This process is repeated several times. Fibrous iron has a fracture like a piece of cane, and is used where resistance to a pulling strain is required, such as anchors, chains, &c. Railway bars are mostly made with the interior of the rail of fibrous iron, to bear the weight of passing trains, while the exteriors are made of granular iron to bear the wearing action of the wheels. The malleable iron of commerce is nearly pure, and may be taken as a type of iron for metallurgical purposes. Wrought-iron is of bluish white color; it is hard and lustrous when polished, and, when rubbed forcibly, it emits a peculiar odour. Its specific gravity is 7.7 to

7.9, and it requires the most intense heat of a wind furnace to melt it.

Smelting of Antimony.—The reduction of antimony to the reguline state consists of two operations. The crude ore is first melted in an inclined plane, in a reverbatory furnace. The melted sulphide fuses and flows away from the slag, or *gangue* as it is called. The sulphide is again roasted, and mixed with carbonate of soda and charcoal. On heating this mixture in a crucible, a quantity of the metal is formed at the bottom. The unreduced oxysulphide which remains on the top is afterwards used for preparing Kerme's mineral. It is never used alone in the arts, but always in conjunction with other metals, to which it imparts a hardening quality and likewise the valuable property of expanding when they cool, *Common type metal* is composed of 4 parts lead and 1 of antimony. *Music type* contains in addition a small portion of tin.

Smelting of Tin.—To extract the metal, the ore is first stamped or washed, to get rid of the lighter particles of sand or earth adhering to it. It is then roasted to free it from arsenic and sulphur, and again washed to carry off the sulphate of copper and oxide of iron. The washed ore is mixed with from one-fifth to one-eighth its weight of powdered anthracite, or charcoal, and a small portion of lime to form a fusible slag with any of the remaining gangue. The charge is placed in the hearth of a low crowned reverberatory furnace, and the doors are closed up. Heat is applied very gradually for five or six hours, care being taken to raise the temperature high enough to cause the carbon to reduce the tin without melting the silicious gangue, which would form with the binoxide an enamel too troublesome to remove. When nearly all the tin is reduced, the heat is raised considerably, the slags being thus rendered fluid and capable of floating on the surface of the melted metal. The tin is then run off into cast-iron pans from which it is ladled off into moulds to form ingots. The tin thus procured is far from being pure, it is therefore submitted to the process of lignation, which consists in heating the ingots to incipient fusion. By this means the purer tin, which fuses at a comparatively low heat, separates, running down and leaving the impure portions behind. The less fusible portion, when re-melted, forms *block tin*, and the part which has run out is again melted and run out with wet stakes. The steam thus formed bubbles up to the surface, carrying with it all the mechanical impurities contained in the tin. The mass is then skimmed and allowed to cool. When just about to set, the upper half is ladled out, the other metals and impurities having sunk into the bottom half, from the tendency that this metal has to separate from its alloys. The finest quality of tin is frequently heated to a temperature just short of its melting point. At this heat, it becomes brittle and is broken up into masses, showing the crystals of the metal, and forming what is known as *grain tin*. The formation of crystals is to some extent a guarantee of its purity, since impure tin does not become brittle in this way. English tin generally contains small quantities of arsenic, copper, iron and lead. Tin fuses at 442° Fahr, but it is not sensibly volatilized at that or any higher temperature. For the manufacture of tin plate the best soft charcoal iron is obliged to be used. After it has been rolled and cut to

so as to flatten them in an instant. The heads, having become hardened by hammering, are now annealed by heating and slow cooling, and are handed to the *piercer*, generally a child, who forms the eye in a second by laying the head upon a block of steel, and by driving a small punch through one side with a smart tap of the hammer, and then exactly opposite on the other. The eyes are then trimmed by driving the punch through them again on a lump of lead and, after laying the needle with the punch sticking through it, upon the block of steel, hammering the head on the sides, which causes it to take the form of the punch. The next operator makes the groove at the eye and rounds the head, which he does with a small file. The needles, being thus prepared, are thrown by the workmen pell-mell into a sort of drum or box, in which they are made to arrange themselves in parallel lines by means of a few dexterous shakes of the workman's arm. They are now ready to be tempered, for which purpose they are ranged on sheet-iron plates, about 30 lbs. weight at a time, containing from 250,000 to 500,000 needles, and are placed in a proper furnace, when they are heated to a bright redness for the larger needles, and to a less intense degree for the smaller; they are then removed, and inverted suddenly over a bath of cold water in such a way that all the needles may be immersed at the same time, yet separate from each other. This has the effect of making them very hard and brittle. The water being run off, the needles are removed for further operations. Some manufacturers heat the needles by means of immersion in melted lead, others throw them into a pan along with a quantity of grease, which, being placed on the fire, the oily matter soon ignites, and after it burns out, the needles are found to be in the proper temper; those which are twisted in the tempering being afterwards straightened by the hammer on the anvil.

Polishing is the next and most expensive and prolonged operation. This is effected on bundles containing 500,000 needles intermixed with quartzoze sand, and a little rape-seed oil. Thirty of those bundles are exposed to the vibratory pressure of wooden tables, which make about 20 horizontal double movements per minute, causing the bundles to run over 2 feet each time, or 800 feet per hour. This agitation is kept up about 18 or 20 hours, causing such a movement and attrition as to polish the needles in the bags or bundles. They are then removed from the packets into wooden bowls and mixed with sawdust to remove the grease and other impurities, placed in a cask, which is turned by a winch; more sawdust is introduced as required, and the turning is continued until the needles become clean and bright. They are then winnowed by a fan to clean them from the sawdust and refuse matter, and are subsequently arranged in regular order on a small, somewhat concave, iron tray. The operation of making up the rolls or bags, polishing, winnowing and arranging them, have to be repeated ten times on the best needles. It is found that emery powder mixed with quartz and mica or pounded granite is preferable to anything else for polishing needles by friction in the bags at the first, emery mixed with olive oil, from the second to the seventh operation, putty, or oxide of tin for the eight and ninth, putty with very little

for the tenth, and lastly bran to give a finish. In this mode of oper-
ng, the needles are scoured in a copper cask studded in the inte-
r with raised points to increase the friction and a quantity of hot
p suds is introduced occasionally to keep them clean. The
k must be slowly turned upon its axis for fear of injuring the
ss of needles it contains. They are finally dried in the wooden
k by attrition with saw dust, then wiped with a linen rag or
t leather—the damaged ones being thrown aside. The *sorting*
erformed in dry appartments, where all the points are first laid
same way, and the needles arranged in the order of their polish
h great rapidity. The workman places 2000 or 3000 needles
an iron ring two inches in diameter, and sets all their heads in
plane, then, on looking carefully at their points, he easily re-
gnizes the broken ones and removes them with an instrument
pted for the purpose. These defective needles pass into the
ds of the *pointer* in order to be ground again, when they form
icles of inferior value. Those needles bent in the polishing must
w be straightened, and the whole are finally arranged by the
t of the finger and thumb of the sorter, and weighed out into
ntities for packing into blue papers. The *bluer* puts the final
ch to them by taking 25 needles at a time between his fore-finger
l thumb, and pressing their points against a small hone-stone
ompact micaceous schist, quadrangular in form, mounted in a
all lathe, turning them briskly round, giving the points a bluish
t, while he polishes and improves them.

ALANCE SPRINGS OF CHRONOMETERS.—The balance springs of
rine chronometers, which are in the form of a screw, are wound
o the square thread of a screw of the appropriate diameter and
rseness; the two ends of the spring are retained by side screws, and
whole is carefully enveloped in platinum foil, and lightly bound
h wire. The mass is next heated in a piece of gun barrel closed
one end, and plunged into oil, which hardens the spring almost
hout discolouring it, owing to the exclusion of the air by the
se platinum covering, which is now removed, and the spring is
down to the blue before removal from the screwed block. The
ance or hair spring of *common* watches are frequently left soft,
se of the *best* watches are hardened in the coil upon a plain cy-
ler and are then curled into the spiral form between the edge
blunt knife and the thumb, the same as in curling up a nar-
r ribbon or paper, or the filaments of an ostrich feather. The
t springs are worth 60 cents each, those hardened and tempered
26 each. This raises the value of the steel, originally less than
ents, to $2000 and $8000 respectively. It takes 3200 balance
ings to weigh an ounce.

ATCH SPRING MANUFACTURE.—Watch springs are hammered
of round steel wire, of suitable diameter until they fill the gauge,
width. which at the same time insures equality of thickness.
holes are punched in their extremities, and they are trimmed
the edge with a smooth file. The springs are then tied up with
ding wire, in a loose *open* coil and heated over a charcoal fire
n a perforated revolving plate. They are hardened in oil and bla-
off. The spring is now distended in a long metal frame, similar to
t used for a saw blade, and ground and polished with emery and

and are passed under a heavy hammer weighing several tons, such as those of iron-works, the blows are given gently at first, owing to the crystalline nature of the mass, but, as the fibre is eleminated, the strength of the blows is increased, till is reduced under the heavy hammer to sizes as small as ¾ of an inch square Smaller bars are finished under tilt hammers, which are much lighter than the preceding, move considerably quicker, and are actuated by springs instead of gravity alone; these condense the steel to the utmost. Rollers are also used, especially for steel of round, half-round, and triangular sections, but the tilt hammer is greatly preferred.

STEEL, BY THE BESSEMER PROCESS.—Mr. Goransson, a Swedish iron master, having fully examined the Bessemer process of making steel, and erected the necessary apparatus at his works at Edsken, after considerable delay in experimenting, has, within a recent period, succeeded in establishing the manufacture of good steel, on a practical scale, and in short devotes his whole establishment to this one process. This steel has been made into engineers' tools, boiler plates, and cutlery; and the improvement must now be regarded as an accomplished commercial fact. Mr. Goransson states, that he has carried out Bessemer's invention to the fullest extent, without ever having had recourse to any of the numerous plans which have been patented by others, under the idea of improving the original simple process. The converting vessel is erected, near the tap hole of the blast-furnace, so that about one ton of fluid pig-iron can be run into the apparatus at a time. The pressure of the blast is from 7 to 8 lbs. to the square inch; and, when continued for 6 or 7 minutes, the whole charge is converted into steel. The fluid steel is discharged into a loam-lined ladle, when it is well stirred, and considerable carbonic oxide disengaged and inflamed. After a short interval of repose, which is probably necessary for the steel to condense from the aërated condition in which it leaves the converting vessel, it is run off from the bottom of the ladle, in a vertical stream from the ingot moulds. The whole time occupied, from the moment the pig-iron leaves the furnace until it is cast in the mould, does not exceed 12 minutes. The loss in weight, including the impurities thrown off, does not exceed 15 per cent., which is only about one-half of the waste incurred in the manufacture of bar-iron by the old system in Sweden. By this improvement, Mr. Goransson states, in a letter to the London *Engineer*, that more than 1000 tons annually of cast-steel can be made with the same quantity of fuel as is now required for making 500 tons of bar-iron. He says: "So completely have we accomplished the object that we now make several tons of large ingots of cast-steel in succession, without a single mishap or failure of any kind. The steel can be made either hard, medium, or soft at pleasure. It draws under the hammer perfectly sound and free from cracks or faults of any kind, and has the property of welding in a most remarkable degree."

PHILLIP'S FIRE ANNIHILATOR.—Consists of a case containing water, within which is a smaller case containing chlorate of potash and sugar. Dipped in the latter is a small tube containing sulphuric acid; when this tube is broken the chlorate of potash and sugar become ignited, throwing off large quantities of mixed gases which are non-supporters of combustion; the action is maintained bp the water in the outer case becoming heated. The gases are conveyed to the fire by means of a flexible tube fitted with a proper nozzle and stop-cock. I have seen still another kind constructed of copper in quite an elegant style, fitted with shoulder straps, &c., for easy transportation, in which the gases were generated by means of chemicals on the principle of what may be seen every day in the effervescence of carbonic acid gas from the intermixture of seidletz powders in water. The chemicals being introduced from white and blue paper packages into the water contained in the copper case.

To Remedy Slip of Driving Belts.—Dab on a little of the sticky oil which oozes away from the bearings of machinery.

To Bend Copper and Brass Pipes.—Run melted lead into your pipe till full, and you may then bend it gradually into any shape you choose, the pipe may then be heated and the lead melted and run out again.

Boring Gun Barrels.—Take a piece of rod, cast steel, ⅛ inch smaller than the interior of the barrel, and a few inches longer, beat one end up something larger than the size of bore, then turn or file it in the shape of an egg, leaving the swell, or centreing part 1-20th of an inch larger than the bore. With a saw file, cut longitudinal cuts, ⅛th inch apart, laying them the same angle as a rose bit countersink, taking care not to injure the periphery of the tool; harden and temper to straw color.

Drilling China, Glass, &c.—To drill china use a copper drill and emery, moistened with spirits turpentine. To drill glass, use a steel drill tempered as hard as possible and camphor and water as a lubricant.

Mallet's Brass.—Copper 25·4; zinc, 74·6, Used to preserve iron from oxidizing.

To Prevent Corrosion in Lead Pipes.—Pass a strong solution of sulphide of potassium and sodium through the inside of the pipe at a temperature of 212, and allow it to remain about ten or fifteen minutes. It converts the inside of the pipe into an insoluble sulphide of lead and prevents corrosion.

To Enamel Copper Vessels.—Pulverise finely 12 parts of fluor spar, 12 parts of unground gypsum, and 1 part borax, and fuse together in a crucible; when cold, mix with water to a paste, and apply to the interior of the vessel with a paint brush; when dry the vessel should be thoroughly baked in a muffle or furnace.

Shoeing of Horses.—As many parts of the horse's hoof are more tender then others, in the case of such animals as have very tender feet, it is the province of the shoeing smith to give ease to such parts and to throw the weight more upon those parts which are better calculated to support it, thus assisting nature in all her operations, in the animal economy. The horse in raising the fore foot for extension, the stress is put upon the flexor muscles,—in particular, the *Flexor pedis perforans*, the tendon of which is inserted into posterior part of the os pedis, or bone at the foot. The longer the toe of the shoe, and straight, the greater leverage is required against the unyielding edge of the toe. By keeping the toe a moderate length, and turning up the toe of the shoe a little, it allows the foot to be easily rotated, consequently less stress is thrown upon the flexor muscles and tendons, and more particularly upon the tendon at that part when it passes over the navicular bone ; it thus lessens the tendency to navicular disease, and, if so affected, this mode of shoeing will give great relief.

PORTABLE TURKISH BATH.—Make a small circular boiler of copper or tin, and fit the same into an upright tin stand, in which, directly under the boilor, you must leave an aperture to contain a small spirit lamp. The boiler lid must fit tightly and be provided with three small tubes pointing upwards. The boiler being filled with water and the lamp lighted, as soon as the steam gets up, it rushes through these tubes,and the patient, seated on a cane chair, with his or her feet in a pan of warm water, with a suitable cloak tightly fastened around the neck, is speedily enveloped in a cloud of steam. Ten minutes is the time recommended for the duration of the first few baths. It may be afterwards increased, but not beyond half an hour. On getting out of the cloak, plunge into a cold bath for a few minutes, then rub the skin till it is quite dry and glowing with a coarse towel and a pair of good hair-gloves. Persons in health or disease will experience a wonderful recuperative power in the frequent use of this bath, and all will find it incomparably superior to the use of drugs in any form whatever. In this connection a new and very ingenious invention called SPONGIO PILINE, is deserving of favourable mention. It consists of wool and small particles of sponge felted together, and attached to a skin of India-rubber, the whole about half an inch in thickness, and of inestimable value as a means of applying cold or tepid water &c., to such exterior parts of the human frame as may be nearest to the seat of pain or disease. The water is sponged over the felted surface, the surplus, if any, wiped off; it is then placed on the skin, and covered over with several folds of bandages, which assist in retaining the heat and moisture, thus attracting healthy blood to the part, from which nature selects such food as is most conducive to expel disease and build up healthy tissue. Nothing is so conducive to health of body, and the eradication of disease therefrom, as pure water when properly applied; and in most beautiful correspondence with natural water we have in the WATER OF LIFE, or Truths from the *Divine Word*, that sovereign antidote which alone when applied to the life, can cure the malignant diseases of our spiritual nature, and purify our affections and thoughts with those hallowed influences which come from above.

BLACK LEAD PENCILS.—The best pencils are made by grinding the black lead into a fine impalpable powder, then forming it into blocks by compression without any cementing substance, and finally sawing it up into the square prisms, which, when placed in grooves in wood form the black lead pencils of commerce. The color can be graduated to any desired tinge by the intermixture of very finely ground clay. By the process of Prof. Brodie, the most untractable graphite may be reduced to the finest powder with great ease. The mineral is coarsely powdered and mixed with 1-15th of chlorate of potash, to which mixture is added twice its weight of sulphuric acid. Chloric acid is disengaged, and, after the mass has cooled, it is well washed, dried, and heated to redness. During the latter operation, the black lead swells and becomes reduced to so fine a powder that it will swim upon water, a little fluoride of sodium is used to dissolve the silicious impurities. The finest quality is found near Burrowdale in Cumberland, England. It is nearly pure carbon, and perfectly free from grit. It is used principally in the manufacture of lead pencils, the coarser quality being used, when ground, for polishing iron work, glazing gunpowder, as a lubricator for machinery, compounded with four times its weight of lard or tallow, and in the manufacture of crucibles for melting metals, as it is very intractable in an intense heat.

TO POLISH PLASTER OF PARIS WORK.—The addition of 1 or 2 per cent. of many salts, such as alum, sulphate of potash, or borax, confers upon gypsum the property of setting slowly in a mass capable of receiving a very high polish.

TO MAKE PLASTER OF PARIS AS HARD AS MARBLE.—The plaster is put in a drum, turning horizontally on its axis, and steam admitted from a steam boiler; by this means the plaster is made to absorb in a short space of time the desired quantity of moisture, which can be regulated with great precision. The plaster thus prepared is filled into suitable moulds; and the whole submitted to the action of an hydraulic press; when taken out of the moulds, the articles are ready for use, and will be found as hard as marble, and will take a polish like it.

MOIRÉ METALLIQUE.—Is a beautiful crystalline appearance given to tin plate by brushing over the heated metal a mixture of two parts of nitric acid, 2 of hydrochloric acid, and 4 of water; as soon as the crystals appear, the plate is quickly washed, dried and varnished.

MOTHER OF PEARL WORK.—This delicate substance requires great care in its workmanship, but it may be cut with the aid of saws, files and drills, with the aid of muriatic or sulphuric acid, and it is polished by colcothar, or the brown red oxide of iron, left after the distillation of the acid from sulphate of iron. In all ornamental work, where pearl is said to be used, for flat surfaces, such as inlaying, mosaic work, &c., it is not real pearl, but mother of pearl that is used.

TO POLISH PEARL.—Take finely pulverized rotten stone and make into a thick paste by adding olive oil; then add sulphuric acid, a sufficient quantity to make into a thin paste, apply on a velvet cork; rub quickly and, as soon as the pearl takes the polish, wash it.

TO POLISH IVORY.—Remove any scratches or file marks that may be present with finely pulverized pumice stone, moistened with water. Then wash the ivory and polish with prepared chalk, applied moist upon a piece of chamois leather, rubbing quickly.

KEROSENE OR CARBON OIL MANUFACTURE.—Petroleum, or rock oil, is a liquid substance, of a dark color, exuding from the earth and containing certain liquid and solid hydrocarbons such as benzole, or benzine, kerosene, paraffine, asphaltum, &c., in a state of solution, in different proportions. It differs greatly in composition, some samples containing solid paraffine and benzole in large quantities, while others do not. Petroleum is separated from its difgreat deal of oxide is produced which is absorbed by the metal. To reduce this oxide, the surface of the melted metal is covered with anthracite or charcoal, and towards the last a young tree is thrust in. This process, which is called poling, disengages the whole of the oxygen from the oxide diffused through the mass. The above is, as nearly as possible, the method of copper-smelting, as employed in England, the processes adopted in Saxony and North America being nearly identical with it, the difference merely being modifications to suit the various impurities contained in the ore. When the ore consists of oxide or carbonate of copper only, it is reduced to the metallic state by simple fusion with charcoal and subsequent poling.

Smelting of Lead.—The ore having been brought to the surface, is first sorted by hand, the purest portions being set aside ready for smelting. The rest is broken by hammers into lumps as large as a walnut, and again sorted. The remainder is then crushed in a mill, and sifted through coarse sieves, the coarser portions being set aside for the stampers, and the finer being subjected to the process of *jigging*. This consists in plunging a sieve containing the ore into water, and shaking it dexterously, so that the smallest particles pass through, leaving the larger pieces in the sieve, with the lightest and least metallic portions uppermost. If the sorted galena be tolerably free from gangue, about 1½ ton of the ore is mixed with 1-15th to 1-40th its weight of lime, and heated to dull redness in a reverberatory furnace, through which a current of air is passing. By this means a large portion of the sulphur is burnt off as sulphurous acid, oxide of lead and sulphate of lead being formed, and much of the ore remaining undecomposed. When the roasting has been carried sufficiently far, the furnace doors are shut and the heat is raised. The sulphate and oxide of lead re-act on the undecomposed sulphide, a large quantity of sulphurous acid is formed, which passes off, leaving large quantities of metallic lead behind. The fire is now damped, and a quantity of lime thrown in, which forms a very infusible slag, allowing the metallic lead to be drawn off into moulds. The slag, which contains a large proportion of lead, is smelted with an additional portion of ore. Lead is refined by being melted in a shallow pan in a reverberatory furnace. By this operation any tin or antimony it may contain is oxidized and removed as skimmings. When a ladleful of the lead under this operation cools with a peculiar crystalline surface, the process is discontinued, and the metal is run off into pigs. For some purposes, such for instance as the making of red lead for the manufacture of flint glass, it is necessary that the lead should be almost chemically pure, as a proportion of copper for instance, amounting only to a few grains per ton, would color the glass and spoil the batch. Silver may be profitably extracted from lead, even when it contains only three or four ounces to the ton, by Pattinson's process. This process depends upon the fact that, as lead solidifies, the first portions that crystallize are pure lead. The operation is, therefore, performed by melting the metal in an iron pot and allowing it to cool gradually; as it cools, the crystals of pure lead are removed by a perforated ladle, and the process continually repeated with fresh portions of lead until the mass con-

bout 300 ounces to the ton. It is then submitted to *cupe-*
See Refining Gold and Silver, page 164.

ifacture of Iron.—The preparation of the ore is effected
ery simple manner, either by pounding or levigating, to
e the clay and silica, or other impurities, or by roasting, to
ff sulphur and carbonic acid, and to render the ore more
crushed. The extraction of the metal from the ore was
y effected by means of charcoal, in what was termed a
n forge, but it is only used now in a few instances. On
t of the loss of metal during the process, it will be better
ribe the usual method of smelting ores in England by the
urnace. A blast-furnace consists of a long cone inverted
shorter cone, at the bottom of which is a vertical passage
the crucible, into which are inserted three pipes called
, through which the blast is conveyed ; also a larger open-
rough which the slag may be withdrawn, at intervals. At
tom is a hole called the tap-hole, usually closed with clay
wing off the reduced metal when a sufficient quantity is
ed. The furnace is fed with coal, limestone and ore, from
near the top, the charge being renewed from time to time
materials burn down. The action by which the ore is
d to the metallic state may be traced as follows. The oxy-
the air of the blast combines with the carbon of the
form carbonic acid during the process of combustion. The
ic acid, during its passage through the rest of the heated
s decomposed, being converted into carbonic oxide. The
ic oxide, still ascending, meets with the hydrogen and coal-
gether with which it forms a reducing mixture, abstracting
ygen of the ore and setting free the iron in a metallic state,
sinks down to the bottom of the furnace, where it comes in
t with the carbon of the coal. With this carbide of iron is
l, increasing the fusibility of the reduced iron to such an
that the lime, clay, and silica present, which have been con-
into a fusible slag, float on the top as an imperfect glass.
ag runs over through the side apertures provided for the pur-
nd the metal is withdrawn every 12 or 24 hours through the
le. It is run into moulds consisting of a long channel, from
ide of which run shorter ones. The central channel is known
sow, the side ones as the *pigs*, hence the term *pig iron*, as
d to rough cast-iron. Great improvements have lately been
in the process of smelting iron, by the introduction of a
l blast for urging the combustion, and by using the com-
le gases issuing from the top of the furnace for heating the
or the boilers of the steam-engines used for the blowing
nes. These improvements are now in use at most of the
pal iron works throughout the kingdom, and an idea of
mportance may be gathered from the fact that 15 years ago
d of 200 tons per furnace was thought to be a large quantity,
as now, at the Ulverstone and other works, 600 and 650 tons
reek is thought an ordinary yield ; not only this, but the
nt of fuel used has been reduced to one-quarter by the same
. The iron that comes from the furnace is generally much
npure to be used for any but the very roughest castings,

it therefore has to be remelted, to drive off, as much as possible, the uncombined carbon, or graphite, silicon, phosphorus, sulphur, and other impurities. A single refusion converts it into what is termed "No. 2 pig," or a grey iron, a fusible and liquid metal ; a second and third still further purifying it from carbon, until it is converted into refined or white iron, in which the whole of the carbon is combined with the metal. This description of cast-iron is only used for conversion into malleable iron, for although it melts easily, it forms a much more pasty mass than some of the intermediate qualities of grey iron, which melt into a more liquid metal, fitting them for casting purposes. Refined iron made from the German spathose ores contains a large quantity of combined carbon and manganese, and crystallizes in large plates. It is termed *spiegel-eisen*, or *mirror iron*, from the brilliancy of its crystalline structure, and is much valued for making steel. Founders are accustomed to divide cast-iron into three or four qualities. No. 1, pig or black cast-iron, which contains a large proportion of uncombined carbon ; No. 2, or grey cast-iron, which contains more combined carbon ; No. 3, or mottled, which contains only a few grains of uncombined carbon, here and there, giving it a mottled appearance ; No. 4, or refined iron, in which the whole of the carbon is combined. No. 4, is very hard and brittle, and is fit for puddling or conversion into malleable or wrought-iron. This is effected by bringing an ingot of refined iron to a state of fusion in a reverberatory furnace, taking care to avoid the contact of fuel. The heat is continued until the ingot parts with its carbon, which is assisted by throwing on it scales of oxide, if produced in the forge. As the carbon burns off, the ingot becomes more and more pasty, until at length it is converted into a granular sandy mass. The heat is now raised until it becomes very intense, and the air is excluded by closing the damper and doors. The metal begins to agglomerate into round masses, or blooms, which the puddler collects on the end of an iron rod, and subjects, while still hot, either to the action of a hammer or to a powerful press, called a sloughing press, which squeezes out the slag and other impurities, and forces the particles of iron closer together. The iron is then rolled into bars, and forms what is called homogeneous iron, a quality of metal much used when great hardness is required. It is distinguished by its granular texture when notched and broken. It is much used for the tops of railway bars, and for the wearing surfaces of railway wheels. Where the fibrous quality of iron is required, it is cut into lengths, after the first process of rolling, then piled longitudinally, heated in a reverberatory furnace, and hammered out. This process is repeated several times. Fibrous iron has a fracture like a piece of cane, and is used where resistance to a pulling strain is required, such as anchors, chains, &c. Railway bars are mostly made with the interior of the rail of fibrous iron, to bear the weight of passing trains, while the exteriors are made of granular iron to bear the wearing action of the wheels. The malleable iron of commerce is nearly pure, and may be taken as a type of iron for metallurgical purposes. Wrought-iron is of bluish white color; it is hard and lustrous when polished, and, when rubbed forcibly, it emits a peculiar odour. Its specific gravity is 7.7 to nd it requires the most intense heat of a wind furnace to melt

ELTING OF ANTIMONY.—The reduction of antimony to the
line state consists of two operations. The crude ore is first
ed in an inclined plane, in a reverbatory furnace. The melted
ide fuses and flows away from the slag, or *gangue* as it is called.
sulphide is again roasted, and mixed with carbonate of soda
charcoal. On heating this mixture in a crucible, a quantity of
netal is formed at the bottom. The unreduced oxysulphide
h remains on the top is afterwards used for preparing Kerme's
ral. It is never used alone in the arts, but always in con-
tion with other metals, to which it imparts a hardening quality
likewise the valuable property of expanding when they cool,
non type metal is composed of 4 parts lead and 1 of antimony.
c type contains in addition a small portion of tin.

ELTING OF TIN.—To extract the metal, the ore is first stamped
ashed, to get rid of the lighter particles of sand or earth ad-
g to it. It is then roasted to free it from arsenic and sulphur,
gain washed to carry off the sulphate of copper and oxide of
The washed ore is mixed with from one-fifth to one-eighth
eight of powdered anthracite, or charcoal, and a small portion
ne to form a fusible slag with any of the remaining gangue.
charge is placed in the hearth of a low crowned reverberatory
ce, and the doors are closed up. Heat is applied very gradu-
for five or six hours, care being taken to raise the temperature
enough to cause the carbon to reduce the tin without melting
ilicious gangue, which would form with the binoxide an enamel
roublesome to remove. When nearly all the tin is reduced, the
is raised considerably, the slags being thus rendered fluid and
ble of floating on the surface of the melted metal. The tin is
run off into cast-iron pans from which it is ladled off into
ds to form ingots. The tin thus procured is far from being pure,
therefore submitted to the process of lignation, which consists
ating the ingots to incipient fusion. By this means the purer
which fuses at a comparatively low heat, separates, running
and leaving the impure portions behind. The less fusible
on, when re-melted, forms *block tin*, and the part which has
ut is again melted and run out with wet stakes. The steam thus
ed bubbles up to the surface, carrying with it all the mechan-
impurities contained in the tin. The mass is then skimmed
allowed to cool. When just about to set, the upper half is
d out, the other metals and impurities having sunk into the bot-
alf, from the tendency that this metal has to separate from its
s. The finest quality of tin is frequently heated to a temper-
just short of its melting point. At this heat, it becomes
e and is broken up into masses, showing the crystals of the
l, and forming what is known as *grain tin*. The formation of
als is to some extent a guarantee of its purity, since impure tin
not become brittle in this way. English tin generally contains
quantities of arsenic, copper, iron and lead. Tin fuses at
Fahr, but it is not sensibly volatilized at that or any higher
erature. For the manufacture of tin plate the best soft char-
ron is obliged to be used. After it has been rolled and cut to

the requisite size, its surface is made chemically clean by immersion for a few minutes in dilute sulphuric acid. The sheets are then heated to a red heat in a reverberatory furnace, withdrawn, allowed to cool, hammered flat, passed between polished rollers, and are now washed in dilute acid. This preparation is needed to free the surface of the iron from the slightest portion of oxide, to which the tin would not adhere. In order to tin them they are plunged one by one into a vessel of tallow, from which they are transferred to a bath of tin. From this they are taken, after a certain time, allowed to drain, and dipped again. The superfluous tin at the edge of the plate is removed by dipping it in the melted tin once more, and detaching it by giving the plate a sharp blow.

ZINC.—In the extraction of zinc from its ores, the blende or calamine is first crushed between rollers and roasted. In the case of the blende this is a tedious process and requires great care. The result in either case is oxide of zinc which is mixed with half its weight of powdered coke or anthracite and introduced into crucibles of peculiar construction. A circular furnace is employed, within which the crucibles are ranged. In the bottom of each crucible is an opening to which a short iron pipe is attached, passing through the bottom of the furnace. To the end of this is affixed a removable tube communicating with a sheet iron-vessel. The hole in the bottom of the crucible having been partially plugged with coke, a charge of ore and coal is introduced, and the top of the crucible luted down. The tube connected with the iron vessel is lowered so as to leave the crucible tube open, and the heat is raised. As soon as the flame at the mouth of the short iron tube begins to turn from white to blue, connection is made with the tube leading to the iron pan, and the zinc gradually distils downwards, partly in powder, and partly in stalactitic masses The crude metal is remelted, skimmed and cast into ingots.

HARD TINNING COMPOUND.—An alloy of nickel, iron and tin has been introduced as an improvement in tinning metals, by the firm of Blaise & Co., Paris. In an experiment to show the tenacity of the nickel, a piece of cast-iron tinned with the compound was subjected for a few minutes to a white heat under the blast, and, although the tin was consumed, the nickol remained as a permanent coating upon the iron. The proportions of nickel and iron mixed with the tin, in order to produce the best tinning, are 10 ozs. of the best nickel and 7 ozs. of sheet iron, to 10 lbs. of tin. These metals are mixed in a crucible to prevent the oxidation of the tin by the high temperature necessary for the fusion of the nickel; the metals are covered with 1 oz. of borax and 3 ozs. pounded glass. The fusion is complete in half an hour, when the composition is run off through a hole made in the flux. In tinning metals with this composition the workman proceeds in the ordinary manner.

STEEL MANUFACTURE.—Steel is manufactured from pure malleable iron by the process called cementation. The Swedish iron from the Dannemora Mines, marked with the letter L in the centre of a circle, and called "Hoop L" is generally preferred Irons of a few other marks are also used for second-rate kinds of steel. The bars are arranged in a furnace that consists of two troughs, about fourteen feet long and two feet square. A layer of charcoal-powder is spread over the bottom, then a layer of bars, and so on, alternately,—the full charge is about ten tons; the top is covered over first with charcoal, then sand, and lastly with the slush or waste from the grindstone trough, applied wet, so as to cement the whole closely down for the entire exclusion of the air. A coal fire is now lighted below and between the troughs; and at the end of about seven days, the bars are found to have increased in weight, the one hundred and fiftieth part, by an absorption of carbon, and to present, when broken, a fracture more crystalline, although less shining, than before. The bars, when thus converted, are also covered with blisters, apparently from the expansion of the minute bubbles of air between them, this gives rise to the name, *blistered steel.* The continuation of the process of cementation introduces more and more carbon, and renders the bars more fusible, and would ultimately cause them to run into a mass if the heat were not checked. To avoid this mischief a bar is occasionally withdrawn and broken to watch the progress, and the work is complete when the cementation has extended to the centre of the bars. The conversion occupies, with the time for charging and emptying the furnace, about fourteen days. A very small quantity of steel is employed in the blistered state, for welding to iron for certain parts of mechanism, but not for edge-tools. The bulk of the blistered steel is passed through one of the two following processes, by which it is made either into shear-steel or cast-steel. *Shear-steel* is produced by piling together six or eight pieces of blistered-steel, about 30 inches long, and securing the ends within an iron ring, terminating in a bar about 5 feet long by way of a handle. They are then brought to a welding heat in a furnace and submitted to the helve or tilt hammer, which unites and extends them into a bar called *Shear-steel* from its having been used in the manufacture of shears for cloth mills, and also German steel, from having been in former years procured from that country. Sometimes the bars are again cut and welded and called *double-shear* steel from the repetition. This process of working, as in the manufacture of iron, restores the fibrous character, and retains the property of welding: the shear-steel is close, hard, and elastic; it is much used for tools, composed jointly of steel and iron, its superior elasticity also adapts it to the formation of springs, and some kinds are prepared expressly for the same, under the name of *spring-steel.* In making *cast-steel,* about 26 or 28 lbs. of fragments of blistered steel, selected from different varieties, are placed in a crucible made of clay, shaped like a barrel, and fitted with a cover, which is cemented down with a fusible lute that melts after a time, the better to secure the joining. Either one or two pots are exposed to a vivid heat, in a furnace like the brass-founder's air furnace in which the blistered-steel is thoroughly melted in the course of 3 or 4 hours; it is then removed by the workman in a glowing state, and poured into a mould of iron, either 2 inches square for bars, or about 6 × 18 inches, for rolling into sheet-steel. For large ingots the contents of two or more pots are run together in the same mould, but it requires extremely great care in managing the very intense temperature that it shall be alike in both or all the pots. The ingots are re-heated in an open fire much like that of the common forge, *minous coal* burns readily, and generates steam rapidly, leaving a white ash; *Caking coal* is unsuited when great heat is required, as the draught of a furnace is impeded by its caking, but it is applicable for the production of gas and coke; *Splint or Hard coal* kindles less readily than caking coal, but when ignited produces a clear and hot fire; *Cherry or Soft coal* does not fuse when heated, is very brittle, ignites readily, and produces a bright fire with a clear yellow flame, but consumes rapidly. The limit of evaporation, from 212° for 1 lb. of the best coal, assuming all of the heat evolved from it to be absorbed, would be 14·9 lbs. The evaporative power of *Coke* in the furnace of a steam boiler, and under pressure, is from 7½ to 8½ lbs. of fresh water, per lb of coke; that of *charcoal* 5½ lbs. of fresh water per lb. Wood will furnish, when properly charred, 23 per cent of charcoal. The slower the charring process goes on, the greater the production. The evaporative power of 1 cubic foot of pine wood is equal to that of 1 cubic foot of fresh water; or, in the furnace of a steam boiler, and under pressure, it is 4¾ lbs. fresh water for 1 lb. of wood. One cord of *hardwood* and 1 cord of *soft* wood, such as the general average in Canada, is equal in evaporative effects to 2000 lbs. of anthracite coal. One cord of the kind of wood used by American river steamers in the West, is equal to 12 bushels, (960 lbs.) of Pittsburg coal; 9 cords cotton, ash and cypress wood are equal to 7 cords yellow pine. The densest woods give the greatest heat, as charcoal generates more heat than flame. The evaporative power of *peat* in the furnace of a steam boiler, and under pressure, is 3½ to 5 lbs. of fresh water for every lb. of fuel. *Bituminous coal* is 13 per cent more effective than *coke* for equal weights, and in England the effects are alike for equal costs. In an experiment under a pressure of 30 lbs. 1 lb. pine wood evaporated 3.5 to 4·75 lbs. water, 1 lb. Lehigh coal, 7·25 to 8·75 lbs. The least consumption of coal yet attained is 1½ lbs. per indicated horspower. It usually varies in different engines from 2 to 8 lbs. Railway experiments demonstrate 1 ton of Cumberland coal, (2240 lbs) to be equal in evaporating effect to 1·25 tons of anthracite coal, and 1 ton of anthracite to be equal to 1·75 cords pine wood; also that 2000 lbs Lackawanna coal are equal to 4500 lbs. best pine woods.

BLOWING ENGINES FOR SMELTING.—The volume of oxygen in air is different, at different temperatures. Thus dry air at 85° contains 10 per cent less oxygen than when it is at the temperature of 32° and when it is saturated with vapor it contains 12 per cent less. If an average supply of 1500 cubic feet per minute is required in winter, 1650 feet will be required in summer. In the manufacture of *Pig Iron*, with *Coke* or *Anthracite coal*, 18 to 20 tons of air are required for each ton; with *Charcoal*, 17 to 18 tons are required for each ton, (1 ton of air at 340° = 29 751, and at 60° = 31 366 *cubic feet.*) The *Pressure* ordinarily required for smelting purposes is equal to a column of mercury from 3 to 7 inches. The capacity of the *Reservoir* if dry, should be 15 times that of the cylinder, if single acting, and 10 times if double acting. The area of the *Pipes* leading to the reservoir should be ·2 that of the blast cylinder, and the velocity of the air should not exceed 35 feet per second. A ton of pig iron requires for its reduction from the ore 310,000 cubic feet of air, or

5·3 cubic feet of air for each pound of carbon consumed. Pressure, 7 lbs. per square inch. An ordinary Eccentric Fan, 4 feet in diameter, [illegible] 5 blade [illegible]0 inches wide, and 4 inches in length, set 1-9-16 inches eccentric, with an inlet opening of 17·5 inches in diameter, and an outlet of 12 inches square, making 870 revolutions per minute, will supply air to 40 tuyeres, each of 1⅝ inches in diamter, and at a pressure per square inch of ·5 inch of mercury. An ordinary eccentric fan blower, 50 inches in diameter, running at 1000 revolutions per minute, will give a pressure of 15 inches of water, and require for its operation a power of 12 horses. Area of tuyere discharge 500 square inches. A non-condensing engine, diameter of cylinder 8 inches, stroke of pisten 1 foot, pressure of steam 18 lbs. (mercurial gauge), and making 100 revolutions per minute, will drive a fan, 4 feet by 2, opening 2 feet by 2, 500 revolutions per minute. The width and length of the *blades* should be at least equal to ¼ or ⅛ the radius of the fan. The *inlet* should be equal to the radius of the fan; and the outlet, or discharge, should be in depth not less than ⅛ the diameter, its width being equal to the width of the fan. When the pressure of a blast exceeds .7 inch of mercury per square inch, .2 will be a better proportion for the width and length of the fan than that above given. The *pressure* or density of a blast is usually measured in inches of mercury, a pressure of 1 lb. per square inch at 60° = 2·0376 inches. When water is used as the element of measure, a pressure of 1 lb. = 27·671 inches. The eccentricity of a fan should be 1. of its diameter. A *Smith's forge* requires 150 cubic feet of air per minute. Pressure of blast ¼ to 2 lbs. per square inch, 1 ton of iron melted per hour in a cupola, requires 3500 cubic feet of air per minute. A *finery forge* requires 100,000 cubic feet of air for each ton of iron refined. A *blast furnace* requires 20 cubic feet per minute, for each cubic yard, capacity of furnace.

GOLD MINING IN COLORADO.--From the veins of Gilpin County alone nearly 600 tons of ore are raised daily, or 180,000 tons annually. Nearly 500 lodes have been assayed or mapped in a circle of three miles in diameter; fully a thousand lodes have been recorded, and more or less work performed on each. From fifteen to twenty miles of reputable lodes are known to exist, upon which there is not less than eight miles of shafting, the deepest being 800 feet. There is not less than 20 miles of drifting on these veins, following the ore deposit in the crevices, and the official assays show the ore to be worth from $40 to $130 per ton. The tailings, or refuse of ore put through the stamps, are found to be worth $20 per ton, notwithstanding from 10 to 20 per cent of the precious metal passes down the stream. The average shipments of bullion from this one county verges on $2,600,000 annually. The machinery required for this immense production consist of 83 stamp mills, 185 engines in place, 4,367 horse power, and 1,597 stamps, of which there are over 800 in use, requiring 1,703 horse power. There are 39 engines used at the shafts of mines for raising ore from the veins and keeping them free from water. These mills contain from 5 to 50 stamps, mostly driven by steam. The ore, broken into fragments, is fed into a battery in which the stamps are raised and allowed to fall, crushing the ore fine enough to flow through a screen placed in front. Mercury is fed in this battery, and the pulverized ore mixed with sufficient water is then made to flow over wide plates of copper amalgamated with quicksilver. The gold, or part of it, adheres, forming an amalgam with the mercury, which is afterwards scraped off, squeezed hard, and the lump retorted in a close retort of iron for the purpose of vaporizing the mercury and getting the gold almost pure; the retorts being subsequently shipped to the East for minting. Each stamp is calculated to do from ½ to ¾ of a ton in 24 hours, requiring about one horse power to each stamp head. Most of the ore is reduced in leased mills abandoned by companies. These mill men charge their customers between $3 and $4 per ton for doing this work and returning the retort of gold. The tailings are partially caught in the best mills on blankets, and reworked at a profit; the bulk, however, passes outside, a portion stopping to be shovelled into a pile, the balance going on to the stream. The waste is nearly or quite equal to the gross yield in bullion. The most profitable branch of vein mining and reduction by the *smelting process* was undertaken by Prof. Hill in 1867, in connection with some Boston and Providence capitalists, and is managed with much ability, energy and skill, compensated by enormous profits, of which the outside public know little or nothing, from the vigilance with which all such information is supressed. From the road side you see from 20 to 30 piles of ore sending forth sulphurous emanations into the air. These piles are first started on a layer of wood, and are run up in a pyramid form some 5 to 6 feet, with a diameter at base of from 16 to 20 feet, and then fired, the sulphur affording the only fuel, after the exhaustion of the wood, to keep the fire going from four to six weeks. This ore has been passed through the sampling works and been paid for, the amount lying thus in piles at one time amounting to, perhaps, $80,000. After roasting sufficiently to drive off the sulphur, and oxidize a portion of the iron, these piles are cooled and the ore carried to the smelting furnaces, where, under a heavy heat, more sulphur is driven off, and the silica or *gangue* matter is made to unite with the oxide of iron to form a slag. At the end of the smelting some 8 or 10 tons are thus reduced to one called "matte," containing from $1,500 to $2,000 in the precious metals, and from 40 to 60 per cent of copper. This product is then shipped in bags to Swansea, England, for separation into the several metals contained. The establishment contains three smelting furnaces and three calcining furnaces, capable of reducing from 20 to 25 tons of ore per day. The tailings which are concentrated along the streams, and are also sold to this establishment, average from $35 to $40 per ton. These works are doubtless the most profitable of the kind known in the world. In working tolerably high grade sulphuretted ores, if the facilities do not admit of sending them to England, the best way is to erect a common furnace, having the fire surfaces of good soap stone; then, to every 150 lbs. of ore, put in one bushel of charcoal and 10 per cent of salt. The ore will readily melt to a slag, and will be pretty well desulphurized. The slag can be n off, and when cold can be broken up and worked like free ore.

EXTRACT SILVER FROM WASTE PRODUCTS.—Mix your refuse an equal quantity of wood charcoal, place in a crucible and it to a bright red heat, and in a short time a silver button e found at the bottom.

OVERING SILVER BY THE PATIO PROCESS.—The operation n by this name is sometimes conducted on an immense . In one instance at the hacienda of Regla near Real de s, there is an establishment the floor of which is 1½ acres in t, built in the most substantial manner, slightly sloped to tate the flow of water. The flooring consists of well matched oards, and this vast receptacle sometimes contains as much 0 tons of argentiferous slime, 30 tons of salt, 3 tons sulphate pper, and 18.000 lbs. of mercury in various stages of the gamating process. The reason why this takes place in the nown manner is because there is a correspondence between fferent ingredients employed in the operation.

CORRESPONDENCES.—The correspondence referred to above sts of a nature inseminated or implanted in each substance o ALMIGHTY ARCHITECT of the Creation, by virtue of which a mutual affinity or sympathy exists between them that ever an intermixture takes place, they as it were attract other, and rush together in a mutual embrace. The science rrespondences is a most wonderful and instructive study, ng, in its varied ramifications, so deeply into the inherent e of every created thing, that there is nothing, and can be ng in the universe but what comes within its consideration. ranscendant importance of the subject is such that it is ving of vastly more elaborate consideration than the transient of a single paragraph, but as it would be a violation of to enter into an extended explanation in this place, the r is referred to the appendix for further illustration.

CURY OR QUICKSILVER.—The ore is cinnabar of a bright ver- color. Its specific gravity is 8098. It is produced in nse quantities at the New Almaden mine in Santa Clara- ty, 12 miles from the town of San José, which is 54 miles San Francisco, Cal. The process by which the fluid metal racted is one of great simplicity. There are 6 furnaces, near the ore is deposited from the mine, and separated according quality; the larger masses are first broken up and then all is up under sheds near the furnace doors. The ore is next d on the furnaces, and a steady though not a strong fire is d; as the ore becomes heated the quicksilver is sublimed, eing condensed it falls by its own weight, and is conducted pes, which lead along the bottom of the furnace to small r reservoirs imbedded in the earth, each containing from gallons of the metal. The furnaces are kept going night y, while large drops of minute streams of the pure metal nstantly trickling down into the receivers; from there it is l to the store house and deposited in large cast-iron tanks or the largest of which is capable of containing 20 tons of quicksilver. Seven or eight days are required to fill the furnaces, extract the quicksilver and remove the residuum. The miners and those who merely handle the quicksilver are not injured thereby, but those who work about the furnaces and inhale the fumes of the metal are seriously affected. Salivation is common, and the attendants on the furnaces are cempelled to desist from their labour every three or four weeks, when a fresh set of hands is put on. The horses and mules are also salivated, and from 20 to 30 of them die every year from the effects of the mercury.

CROCUS POWDER FOR POLISHING.—Chloride of sodium and sulphate of iron are well mixed in a mortar. The mixture is then put into a shallow crucible and exposed to a red heat; vapor escapes and the mass fuses. When no more vapor escapes, remove the crucible and let it cool. The color of the oxide of iron produced, if the fire has been properly regulated, is a fine violet; if the heat has been too high it becomes black. The mass when cold is to be powdered and washed, to separate the sulphate of soda. The powder of crocus is then to be submitted to a process of careful elutriation, and the finer particles reserved for the more delicate work. An excellent powder for applying to razor strops is made by igniting together in a crucible, equal parts of well dried green vitrol and common salt. The heat must be slowly raised and well regulated, otherwise the materials will boil over in a pasty state, and be lost. When well made, out of contact with air, it has the brilliant aspect of black lead. It requires to be ground and elutriated, after which it affords, on drying, an impalpable powder, that may be either applied on a strop of smooth buff leather, or mixed up with *hogh's* lard or tallow into a stiff cerate.

CEMENTING EMERY TO WOOD.—Melt together equal parts of shellac, white resin and carbolic acid in crystals; add the last after the others are melted.

TO COAT IRON WITH EMERY.—Give the iron a good coat of oil and white lead, then when this gets hard and dry, apply a mixture of glue and emery.

TO CLEAN COTTON WASTE.—Pack the waste in a tin cylinder with a perforated false bottom and tube withstop-cock at bottom. Pour on the waste bisulphide of carbon sufficient to cover, and allow to soak a few minutes, then add more bisulphide, and so on for a time or two, and then squeeze out. By simple distillation, the whole of the bisulphide, or nearly all, can easily be recovered and so be used over again This will free the cotton completely from grease.

BLOWING OUT STEAM BOILERS.—This should never be done under steam pressure. The safety valve should first be raised until the pressure is all removed by letting the steam escape as rapidly as possible, thenthe hand hole plate or other device should be opened, and the dirt and sediment will run out with the water. But if the boiler is allowed to cool off, the dirt will settle to the bottom and be fastened on with the heat. The dirt is always on the top of the water when there is any pressure of steam on it.

BOILER SCALE.—Sal soda, 40 lbs., gum catecha, 5 lbs., sal ammoniac, 5 lbs., is strongly recommended by an experienced person or removing boiler scale, one pound of the mixture being added to ach barrel of water in the tank; after scale is removed use sal oda alone. By the use of 10 lbs. soda per week a boiler 26 feet ong and 40 inches diameter was cleaned from scale equal to a new oiler.

Mildew on Sails can be prevented by soaping the mildewed arts and then rubbing in powdered chalk. The growth of the nildew fungus can be prevented by steeping the canvas in an queous solution of corrosive sublimate. *Another way.* Slacked ime 2 bushels, draw off the lime water, and mix it with 120 gals. vater, and with blue vitriol ¼ lb.

To Mend Cracked Cast-Iron Vessels.—Drill a hole at each extreme end of the crack, to prevent its further extension, plug rivet he holes with copper, and, with fine iron filings saturated with rine, caulk the crack. Four parts of pulverized clay and one art of iron filings made into a paste with boiling linseed oil and pplied hot is a good cement for the same purpose.

French Putty.—Seven pounds linseed oil and 4 lbs. brown mber are boiled for two hours, and 62 grammes wax stirred in. fter removal from the fire 5½ lbs. fine chalk and 11 lbs. white lead re added and thoroughly incorporated; said to be very hard and ermanent.

Plating with Nickel may be effected by placing the object to be lated, either of iron, steel, copper, bronze, zinc or lead, in a oiling neutral solution of zinc chloride containing a salt of nickel nd granulated zinc. If the zinc solution is acid, the coating of ickel is dull. A plating of cobalt may be made in the same nanner.

Fine Blue Finish for Gun Barrels.—Apply nitric acid and let t eat into the iron a little; then the latter will be covered with a hin film of oxide. Clean the barrel, oil and burnish. A very fine ppearance is given to gun barrels by treating them with dilute itric acid and vinegar, to which has been added sulphate of opper. The metallic copper is deposited irregularly over the iron urface; wash, oil and rub with a hard brush.

Liquid Black Lead Polish.—Black lead pulverized 1 lb., turentine, 1 gill, water, 1 gill, sugar 1 oz.

Copperas Dip for Cast Iron.—Dissolve [illegible] lbs. of sulphate of opper and add 2 fluid ozs. sulphuric acid.

To Harden Metals.—Iron, 60 parts, chrome, 40 parts, form a omposition as hard as the diamond. A high degree of hardness nay also be imparted to iron or steel by adding ¼ part of silver, opper may be externally hardened by the fumes of zinc and tin. he specula of Lord Ross's telescope is 1 part tin and 1 part opper, this is as hard as steel, and takes a very high polish; if nore than this be added it will scarcely cohere.

Good Brass for Machinery.—1. Copper, 2 lbs., tin, 2½ ozs., zinc, oz. 2. *Tough Brass.* Copper, 10 ozs., tin, 1½ ozs., zinc, 1½ ozs. . *Wheels and Valves.* Copper, 90 lbs., tin, 10 lbs. 4. *Brass, very nacious.* Copper, 88.9 parts, tin, 8.3 parts, zinc, 2.8 parts. 5. *athe Bushes.* Copper, 80 parts, tin, 20 parts. *Machinery Bearings.* opper, 88 parts, tin, 12 parts.

PAINT FOR SHEET IRON SMOKE PIPE.—Good varnish ½ gallon, boiled linseed oil ½ gallon, add red lead sufficient to bring to the consistency of common paint. Apply with a brush. Applicable to any kind of iron work exposed to the weather.

BLACK COLOR ON BRASS WORK.—Make a strong solution of nitrate of silver in one dish and nitrate of copper in another. Mix the two together, and plunge in the brass. Now heat the brass evenly till the required degree of dead blackness is acquired. Unrivalled as a beautiful color on optical instruments.

METALLIC BATH FOR TEMPERING.—Use a black lead or cast iron crucible, (of the requisite depth) and place the same, filled with lead, on a fire made of coal or charcoal, and surrounded on all sides by a metallic or brick wall, level, or nearly so, with the top of the crucible; but at a sufficient distance (say 5 or 6 inches) from it to receive the fuel necessary to maintain the fire, in order to keep the lead in a melted state. Let the crucible rest on iron bars, and leave apertures to admit air to the fire. The articles, slightly greased to prevent the adherence of oxide, are immersed in the melted lead (which is kept at a red heat) by means of tongs, two or three pairs being generally used, in order that one or two pieces may be heated while the other is undergoing manipulation by the hardening process. Keep the lead covered with charcoal dust or cinders. This plan is used by many cutlers and file manufacturers for giving the proper degree of heat in the tempering of their wares. The process is highly valued by those who use it. See file manufacture, page 238.

EFFECTS OF HEAT ON VARIOUS BODIES.

Fine Gold melts	2590°	Heat, cheny red	1500
" Silver "	1250	" bright "	1860
Copper melts	2548	" red visible by day	1077
Wrought Iron melts	3980	" white	2900
Cast " "	3479	Mercury boils	662
Bright red " in the dark	752	" volatilizes	680
Red hot " in twilight	884	Platinum melts	3080
Glass melts	2377	Zinc melts	740
Common fire	790	Highest natural temperature (Egypt)	117
Brass melts	1900	Greatest natural cold (below zero)	56
Air furnace	3300	" artificial " "	166
Antimony melts	951	Heat of human blood	98
Bismuth "	476	Snow and Salt, equal parts	0
Cadmium	600	Ice melts	32
Steel	2500	Water in *vacuo* boils	98
Lead	504	Furnace under steam boiler	1500
Tin	421		

SHRINKAGE OF CASTINGS.

Iron, small cylind's	1-16th in. per ft	Ditto, in length	⅛ in 16 ins.
" Pipes	⅛ " " ft.	Brass, thin	⅛ in 9 "
" Girders, beams, ect.	⅛ in. in 15 ins.	Brass, thick	⅛ in 10 "
" Large cylinders, the contraction of diameter at top	1-16th per foot	Zinc	5-16ths in a foot
		Lead	5-16ths " "
		Copper	3-16ths " "
		Bismuth	5-32nds " "
Ditto at bottom	1-12th per foot.		

en sand iron castings are 6 per cent. stronger than dry, and · cent. stronger than chilled, but when the castings are chil- nd annealed, a gain of 115 per cent. is attained over those in green sand. Chilling the under side of cast iron very ially increases its strength.

s MANUFACTURE.—Charcoal 138 bushels, limestone 432 lbs., ore 2612 lbs., will produce 1 ton of pig iron. In England, rature of hot blast is 600°, density of blast and of refining ce 2½ to 3 lbs. per square inch. Revolutions of puddling 60 per minute; rail rolls, 100; rail saw, 800.

IE POWER (INDICATED) REQUIRED FOR DIFFERENT PROCESSES.

Furnace	60	Railway rolling train	250
ng "	26	Small bar train	60
ing Rolls with squeezers		Double rail saw	12
shears	80	Straightening	7

 pound of Anthracite coal in a cupola furnace will melt from .0 lbs of cast iron; 8 bushels of bituminous coal will melt 1 ton t iron. Small coal produces about ¾ of the effect of large of the same kind

LOCITIES OF WOOD WORKING MACHINERY.—*Circular Saws* at hery, 6000 to 7000 ft. per minute; *Band Saws*, 2500 feet; *Gang* , 20 inch stroke, 120 strokes per minute; *Scroll Saws*, 300 es per minute; *Planing Machine Cutters* at periphery, 4000 to feet. Work under planing machine $\frac{1}{20}$th of an inch for each *Moulding Machine Cutters*, 3500 to 4000 feet; *Squaring-up ine Cutters*, 7000 to 8000 feet; *Wood Carving Drills*, 5000 re- tions; *Machine Augers*, 1¼ in. diam., 900 revolutions; ditto, ¾ am., 1200 revolutions; *Gang Saws* require for 45 superficial of pine per hour, 1 horse power. *Circular Saws* require 75 ficial feet per hour, 1 horse power in oak or hard wood ¾ths of bove quantity require 1 horse power; *Sharpening Angles of ine Cutters.* Adzing soft wood across the grain, 30°,; *Plan- Machines*, ordinary soft wood 35°; *Gauges and Ploughing ines*, 40°; *Hardwood Tool Cutters*, 50° to 55°.

OUR MILL MACHINERY.—For each pair of 4 feet stones, with all necessary dressing machinery, etc., there is required 15 horses' r. *Stones*, 4 ft. diam., 120 to 140 revolutions per minute. *sing Machines*, 21 ins. diam., 450 to 500 revolutions per te. *Elevator*, 18 ins. diam., 40 revolutions per minute. *pers*, 3½ ins. pitch, 75 revolutions per minute. *Screen*, 16 ins. ., 300 to 350 revolutions per minute. 788 cubic feet of water, arged at a velocity of 1 foot per second, are necessary to d and dress 1 bushel of wheat per hour=1.49 horses' power per el. 2000 feet per minute for the velocity of a stone 4 feet in . may be considered a maximum speed.

ATER.—*Fresh Water.* The component parts by weight and ure is, *Oxygen*, 88.9 by weight, and 1 by measure, *Hydrogen*, by weight, and 2 by measure. One cubic inch of distilled r at its maximum density of 39°. 83, the barometer at 30 es, weighs 252.6937 grs., and it is 828.5 times heavier than atmospheric air. A cubic foot weighs 998.068 ounces, or 62.37925 lbs. avoirdupois, but for facility of computation the weight is usually taken at 1000 ounces and 62.5 lbs. By the British Imperial Standard, the weight of a cubic foot of water at 62°, the barometer at 30 ins.=998.224 ounces. At a temperature of 212° its weight is 59.625 lbs. Below 39°. 83, its density decreases at first very slow, but progressing rapidly to the point of congelation, the weight of a cubic foot of ice being but 57.25.35· 84 cubic feet of water weigh a ton. 3913 cubic feet of ice weigh a ton. River or canal water contains $\frac{1}{20}$th of its volume of gaseous matter; spring or well water $\frac{1}{14}$th. *Sea Water*—A cubic foot of it weighs 64.3125 lbs., 34.83 cubic feet weigh 1 ton. Sea water contains from 4 to 5¼ ozs. of salt in a gallon of water, varying according to locality, and 62 volumes of carbonic acid in 1000 of water. Dr. Arnott estimated the extreme height of the waves of an ocean, out on the open sea and free from any influence of land, to be 20 feet. The French exploring expedition computed waves of the Pacific to be 22 feet. The average force of the waves of the Atlantic Ocean during the summer months, as determined by Thomas Stevenson, was 611 lbs. per square foot; for the winter months, 2086 lbs. During a heavy gale a force of 6383 lbs. was observed. *Destructive effect of Sea water upon Metals and Alloys per square foot.* Steel 40 grs.; iron 38; copper 9; zinc 8; galvanized iron 1.5; tin 2.

WARMING BUILDINGS OR APARTMENTS—*By low pressure steam* (1½ to 2 lbs.) *or hot water.*—One square foot of plate or pipe surface will heat from 49 to 100 cubic feet of inclosed space to 75° in a latitude where the temperature ranges from—10°, or 10° below zero. The range from 40 to 100 is to meet the conditions of exposed or corner buildings, of buildings less exposed, as the intermediate ones of a block, and of rooms intermediate between the front and rear. As a general rule, 1 square foot will heat 75 cubic feet of air in outer or front rooms, and 100 in inner rooms. *By High Pressure Steam*—When steam at a pressure exceeding 2 lbs. per square inch is used, the space heated by it will be in proportion to its increase of temperature above that pressure less the increased radiation of heat in its course to the place of application. One cubic foot of water evaporated is required for every 2000 cubic feet of inclosed space.

ASPHALTIC MASTIC.—Is composed of nearly pure carbonate of lime and about 9 or 10 per cent. of bitumen. When in a state of powder it is mixed with about 7 per cent. of bitumen or mineral pitch. The powdered asphalt is mixed with the bitumen in a melted state along with clean gravel, and consistency is given to pour it into moulds. The asphalt is ductile, and has elasticity to enable it, with the small stones sifted upon it, to resist ordinary wear. Sun and rain do not affect it, wear and tear do not seem to injure it. The pedestrian in many cities in the United States and Canada, can readily detect its presence on the sidewalk by its peculiar yielding to the foot as he steps over it. It is also a most excellent roofing material when rightly applied, it being on record in France that a stout roof of this material withstood the accidental fall of a stack of chimneys, with the only effect of bruising the mastic, readily repaired.

THINGS WORTH KNOWING.—1. *Rust Joint, quick setting*: Sal-ammoniac, pulverized, 1 lb.; flour of sulphur, 2 lbs; iron borings 80 lbs, mix to a paste with water in quantities as required for immediate use. 2 *Quick setting joint better than the last, but requires more time to set.* Sal ammoniac, 2 lbs.; sulphur, 1 lb.; iron filings, 206 lbs. 3. *Air and water-tight cement for casks and cisterns:* Melted glue, 8 parts; linseed oil, 4 parts; boiled into a varnish with litharge hardens in forty-eight hours. 4. *Marine Glue:* India rubber part coal tar, 12 parts; heat gently, mix, and add 20 parts of powdered shellac, pour out to cool, when used, heat to about 250°. 5. *Another ditto*. Glue, 12 parts; water sufficient to dissolve: add yellow resin, 3 parts; melt, then add turpentine, 4 parts; mix thoroughly together. 6. *Water-proof varnish for harness*. India rubber, ½ lb.; spirits of turpentine 1 gal.; dissolve to a jelly, then take hot linseed oil, equal parts with the mass, and incorporate them well over a slow fire 7. *Blacking for harness:* Beeswax, ½ lb; ivory black, 2 oz. spirits of turpentine, 1 oz.; Prussian blue, ground in oil, 1 oz.; copal varnish, ½ oz.; melt the wax and stir it into the other ingredients before the mixture is quite cold; make it into balls, rub a little upon a brush, apply it upon the harness and polish lightly with silk 8. *Anti-friction grease:* Tallow, 100 lbs. palm oil, 70 lbs boil together when cooled to 80°, strain through a sieve, and mix with 28 lbs. soda and ½ gals. water. For winter take 25 lbs. more oil in place of the tallow. 9. *Another* Pulverized black lead, 1 part; lard, 4 parts. mix. 10. *Booth's Railway Axle Grease:* Water, 1 gal.: clean tallow, 3 lbs., palm oil, 6 lbs. common soda, ½ lb. or tallow [illegible] lbs., palm oil, 10 lbs. Heat to about 212°, and stir well until it cools to 70°. 11. *To remove old Iron moulds:* Moisten the part stained with ink, remove this by the use of muriatic acid diluted by five or six times its weight of water, when the old and new stains will be removed. 12. *Whitewash for outside work* Black lime, ½ bushel, in a barrel; add common salt, 1 lb. sulphate of zinc, ½ lb., sweet milk, 1 gal.; bring to a proper consistence with water, and apply with a white-wash brush. *Asphalt composition*: Mineral pitch, 1 part; bitumen 11 parts; powdered stone or wood ashes, 7 parts. 14. *Composition for streets and roads* Bitumen, 16.875 parts asphaltum, 225 parts oil of resin, 6.2. parts and sand 1·35. Thickness from 1¼ to 1⅜ inches. Asphaltum, 55 lbs., and gravel, 28.7 lbs. will cover an area of 10.75 square feet. 15. *Cement for external use:* Ashes, 2 parts; clay, 3 parts; sand, 1 part mix with a little oil, very durable. 16. *Cement for Shoemakers and Channelers* India rubber dissolved to a proper consistency in sulphuric ether. 17. *Mortar*. Lime, 1 part; clean sharp sand, 2½ parts. An excess of water in slaking the lime swells the mortar, which remains light and porous, or shrinks in drying: an excess of sand destroys the cohesive properties of the mass 18. *Stone mortar* Cement, 8 parts; lime, 3 parts, and 31 parts of sand. 19. *Brown mortar* Lime, 1 part; sand, 2 parts, and a small quantity of hair. 20. *Brick mortar:* Cement, 3 parts; lime, 3 parts, sand, 27 parts. Lime and sand,

and cement and sand, lessen about ¼ in volume when mixed together. 21. *Turkish mortar:* Powdered brick and tiles, 1 part; fine sifted lime, 2 parts; mix to a proper consistency with water, and lay on layers of five or six inches thick between the courses of brick or stone, being useful on massive or very solid buildings. 22. *Interior plastering—Coarse stuff:* Common lime mortar, as made for brick masonry, with a small quantity of hair; or by volumes, lime paste (30 lbs. lime) 1 part; sand, 2 to 2¼ parts; hair 1-6 part. When full time for hardening cannot be allowed, substitute from 15 to 20 *per cent.* of the lime by an equal portion of hydraulic cement. For the second or *brown coat* the proportion of hair may be slightly diminished. *Fine stuff* (lime putty): Lump lime slaked to a paste with a moderate volume of water, and afterwards diluted to the consistency of cream, and then to harden by evaporation to the required consistency for working. In this state it is used for a *slipped coat*, and when mixed with sand or plaster of Paris it is used for the *finishing coat*. *Gauge stuff or Hard Finish* is composed of 3 to 4 volumes of fine stuff and 1 volume of plaster of Paris, in proportions regulated by the degree of rapidity required in hardening for cornices, &c., the proportions are equal volumes of each, fine stuff and plaster. *Stucco* is composed of from 3 to 4 volumes of white sand to 1 volume of fine stuff, or lime putty. *Scratch coat:* The first of 3 coats when laid upon laths, and is from ¼ to ⅜ of an inch in thickness. *One coat work:* Plastering in one coat without finish, either on masonry or laths, that is, rendered or laid. *Two coat work:* Plastering in two coats is done either in a *laying coat and set* or in a *screed coat or set. The Screed Coat* is also termed a *Floated Coat. Laying* the first coat in two coat work is resorted to in common work instead of *screeding*, when the finished surface is not required to be exact to a straight edge. It is laid in a coat of about ¼ inch in thickness. The laying coat, except for very common work, should be *hand-floated*, as the tenacity and firmness of the work is much increased thereby. *Screeds* are strips of mortar, 26 to 28 inches in width, and of the required thickness of the first coat, applied to the angles of a room, or edge of a wall and parallelly, at intervals of 3 to 5 feet over the surface to be covered. When these have become sufficiently hard to withstand the pressure of a straight edge, the interspaces between the screeds should be filled out flush with them, so as to produce a continuous and straight, even surface. *Slipped Coat* is the smoothing off of a brown coat with a small quantity of lime putty, mixed with three per cent of white sand so as to make a comparatively even surface. This finish answers when the surface is to be finished in distemper or paper. *Hard Finish:* Fine stuff applied with a trowel to the depth of about ⅛ of an inch.

EARTH DIGGING.—*Number of cubic feet of earth in a ton.* Loose earth 24; coarse sand 18·6. Clay 18·6. Earth with gravel 17·8. Clay with gravel, 14·4. Common soil 15·6. The volume of earth and sand in bank exceeds that in embankment in the following proportions; sand ⅛, clay ⅙. gravel $\frac{1}{12}$, and the volume of rock in embankments quarried in large fragments exceeds that in bank fully one half.

ESTIMATE OF MATERIALS AND LABOR FOR 100 SQUARE YARDS OF LATH AND PLASTER.

Materials and Labor.	Three Coats Hard finish	Two Coats Slipped	Materials and Labor.	Three Coats Hard finish	Two coats Slipped.
Lime.......	4 Casks.	8½ Casks.	White Sand	2½ bushels	
Lump Lime	⅝ "		Nails.......	13 lbs	18 lbs.
Plaster of			Masons.....	4 days	8½ days
Paris.....	⅛ "		Labourer..,	3 "	2 "
Laths......	2000 "	2000 "	Cartage....	1 "	¾ "
Hair........	4 bushels	3 bushels			
Sand.......	6 loads.	6 loads			

TERRA COTTA MANUFACTURE.—In the terra cotta manufacture of the north of England and Scotland, the purest lumps of fire clay are selected by their color and texture, and used alone without any other clay, while the firms near London prepare more carefully a mixture of clays, which produce a body of better texture. One of the chief difficulties met in manufacturing terra cotta figures and ornamental works is the contraction the clay suffers after it has left the mould; first, in drying; afterwards, in firing. By mixing the clays,a further advantage is gained in the diminished shrinkage, as fire clay terra cotta (that is, unmixed) shrinks in lineal dimensions about 12 per cent from the time it leaves the mould until it leaves the kiln; the mixed clay terra cotta shrinks 6 per cent or less, and red clays shrink 3 per cent. To enhance the durability of the body of terra cotta, a partial vitrification of the mass is aimed at by adding clays and substances which contain a small amount of alkalies which act as a flux to fuse the body harder; also vitrifying ingredients, pure white river sand, old fire brick, ground fine, previously ground clay called "grog." are added in various proportions, amounting even to 25 per cent. They counteract excessive shrinkage, act as vitrifying elements, and keep the color lighter. In the manufacture the mixture of clays is ground under an edge runner to the consistency of flour. The mills have either revolving or stationary pans; the former do the most work. In order to mix and incorporate the different clays, a subsequent careful pugging is required, for which hot water is sometimes used. The mixture, when brought to the proper homogeneous consistency, is placed in a plaster mould, dried near the kilns or otherwise, and baked in a kiln for five or seven days, during which time it is slowly brought to a white heat, and as gradually cooled down again. In order to avoid twisting and warping during the firing, it is necessary, besides complete mixing of clays, that the mould be shaped so as to give a uniform thickness of material throughout, and if the temperature of the kiln be well graded, the homogeneous body will not warp. To cheapen terra cotta building blocks, they are made hollow, and filled, during the construction, with concrete or cement. Although in the kilns the productions are separated from the wares, it is found that the use of sulphurous fuel darkens and tarnishes the surface, and it is to be avoided. This material admits of being used with the greatest facility in the formation of the most elaborate architectoral ornaments and other beautiful designs, which can be multiplied to any required extent at a very cheap rate. A piece of four inch column tested at the 1851 Exhibition required a pressure of 400 tons per square foot to crush it, or as much as good granite and two to three times as much as most building stone.

BLASTING ROCKS, &C.—In small blasts 1 lb. of powder will loosen about 4½ tons. In large blasts 1 lb. of powder will loosen about 2½ tons; 50 or 60 lbs. of powder, inclosed in a resisting bag hung or propped up against a gate or barrier, will demolish any ordinary construction. One man can bore, with a bit 1 inch in diameter, from 50 to 60 inches per day of 10 hours in granite or 300 to 400 ins. per day in limestone. Two strikers and a holder can bore with a bit 2 ins. in diameter 10 feet per day in rock of medium hardness.

LABOUR ON EMBANKMENTS. *Single horse and cart.* A horse with a loaded dirt cart employed in excavation and embankment, will make 100 lineal feet, or 200 feet in distance per minute, while moving. The time lost in loading, dumping, awaiting, etc,=4 minutes per load. A medium laborer will load with a cart in 10 hours, of the following earths, measured in the bank: *Gravelly earth* 10, *Loam* 12, and *Sandy earth* 14 cubic yards; *carts* are loaded as follows: *Descending hauling*, ⅓ of a cubic yard in bank, *Level hauling* ¼ of a cubic yard in bank; *Ascending hauling*, ⅕ of a cubic yard in bank. *Loosening &c.* In *loam*, a three-horse plow will loosen from 250 to 800 cubic yards per day of 10 hours. The *cost* of loosening earth to be loaded will be from 1 to 8 cents per cubic yard, when wages are 105 cents per day. The cost of trimming and bossing is about 2 cents per cubic yard. *Scooping*, A scoop load will measure $\frac{1}{10}$ of a cubic yard, measured in excavation. The time lost in loading, unloading and trimming, per load, is 1¼ minutes. The time lost for every 70 feet of distance, from excavation to bank, and returning is 1 minute. In *Double Scooping*, the time lost in loading, turning, &c., will be 1 minute; and in *Single Scooping*, it will be 1¾ minutes. (Ellwood Morris.)

HAULING STONE—A cart drawn by horses over an ordinary road will travel 1·1 miles per hour of trip. A 4 horse team will haul from 25 to 36 cubic feet of lime stone at each load. The time expended in loading, unloading, &c., including delays, averages 35 minutes per trip. The cost of loading and unloading a cart, using a horse cram at the quarry, and unloading by hand, when labour is $1.25 per day, and a horse 75 cents, is 25 cents per perch=24.75 cubic feet. The work done by an animal is greatest when the velocity with which he moves is ⅙ of the greatest with which he can move when not impeded, and the force then exerted ·45 of the utmost force the animal can exert at a dead pull.

HAY.—270 cubic feet of new meadow hay, and 216 and 243 from large or old stacks, will weigh a ton, 297 to 324 cubic feet of dry clover weigh a ton.

WHEEL GEARING.—The *Pitch Line* of a wheel, is the circle upon which the pitch is measured, and it is the circumference by which the diameter, or the velocity of the wheel is measured. The *Pitch*, is the arc of the circle of the pitch line, and is determined by the number of teeth in the wheel. The *True Pitch*, (*chordial*), or that by which the dimensions of the tooth of a wheel are alone determined, is a straight line drawn from the centres of two contiguous teeth upon the pitch line. The *Line of Centres*, is the line between the centres of two wheels. The *Radius* of a wheel is the semi-diameter running to the periphery of a tooth. The *Pitch Radius*, is the semi-diameter running to the pitch line. The *Length of a tooth*, is the distance from its base to its extremity. The *Breadth* of a tooth, is the length of the face of wheel. A *Cog Wheel*, is the general name for a wheel having a number of cogs set upon or radiating from its circumference. A *Mortice Wheel*, is a wheel constructed for the reception of teeth or cogs, which are fitted into recesses or sockets upon the face of the wheel. A *Cog Wheel* is the general term for a wheel having a number of cogs or teeth set upon or radiating from its circumference. A *Mortice Wheel*, is a wheel constructed for the reception of teeth or cogs, which are fitted into recesses or sockets upon the face of the wheel. *Plate Wheels*, are wheels without arms. A *Rack* is a series of teeth set in a plane. A *Sector* is a wheel which reciprocates without forming a full revolution. A *Spur Wheel*, is a wheel having its teeth perpendicular to its axis. A *Bevel Wheel*, is a wheel having its teeth at an angle with its axis. A *Crown Wheel*, is a wheel having its teeth at a right angle with its axis. A *Mitre Wheel* is a wheel having its teeth at an angle of 45° with its axis. A *Face Wheel*, is a wheel having its teeth set upon one of its sides. An *Annular* or *Internal Wheel*, is a wheel having its teeth convergent to its centre. *Spur Gear*, Wheels which act on each other in the same plane. *Bevel Gear*, Wheels which act upon each other at an angle. When the tooth of a wheel is made of a different material from that of the wheel, it is termed a *cog*: in a pinion it is termed a *leaf*, and in a trundle it is termed a *stave*. A wheel which impels another is termed the *spur*, *driver*, or *leader*: the one impelled is the *pinion*, *driver*, or *follower*. A series of wheels in connection with each other is termed a *train*. When two wheels act on each other, the greater is termed the *wheel* and the lesser the *pinion*. A *Trundle*, *Lantern*, or *Wallower* is when the teeth of a pinion are constructed of round brass solid cylinders set in two discs. A *Trundle* with less than eight staves cannot be operated uniformly by a wheel with any number of teeth. The material of which cogs are made is about one fourth the strength of cast iron. *Buchanan* rules that to increase or diminish the velocity in a given proportion and with the least quantity of wheel-work, the number of teeth in each pinion should be to the number of teeth in its wheel as 1, 3, 59. Even to save space and expense, the number should never exceed 1; 6. The least number of teeth that it is practicable to give to a wheel is regulated by the necessity of having at least one pair always in action, in order to provide for the contingency of a tooth breaking. The teeth of a wheel should be as small and numerous as is consistent with strength When a *pinion is driven by a wheel*, the number of teeth in the pinion should not be less than eight. When *a wheel is driven by a pinion*, the number of teeth in the pinion should not be less than ten. The *number of teeth* in a wheel should always be prime to the number of the pinion, that is, the number of teeth in the wheel should not be divisible by the number of teeth in the pinion without a remainder; this is in order to prevent the same teeth coming together so often as to cause an irregular wear of their faces. An odd tooth introduced into a wheel is termed a *hunting tooth* or *cog*.

To COMPUTE THE NUMBER OF TEETH REQUIRED IN A TRAIN OF WHEELS TO PRODUCE A GIVEN VELOCITY. Rule.—Multiply the number of teeth in the driver by its number of revolutions, and divide the product by the number of revolutions of each pinion, for each driver and pinion.

Example.—If a driver in a train of three wheels has 90 teeth, and makes 2 revolutions, and the velocities required are 2, 10, and 18, what are the number of teeth in each of the other two.

10 : 90 : : 2 . 18=*teeth in 2nd wheel.*
18 : 90 : : 2 : 10=*teeth in 3rd wheel.*

To COMPUTE THE DIAMETER OF A WHEEL, *Rule.*—Multiply the number of teeth by the pitch, and divide the product by 3, 1416.

Example.—The number of teeth in the wheel is 75, and the pitch 1, 675 ins: what is the diameter of it?

$$\frac{75 \times 1.6755}{3.1416}=10 \textit{ ins.}$$

To COMPUTE THE TRUE OR CHORDIAL PITCH, *Rule.*—Divide 180 by the number of teeth, ascertain the sine of the quotient, and multiply it by the diameter of the wheel.

Example.—The number of teeth is 75, and the diameter 40 inches; what is the true pitch?

$$\frac{180}{75}=2\rho 24' \text{ and } \textit{sin.} \text{ of } 2\rho 24'=.\,04188, \text{ which } \times 40=1.6752 \text{ ins.}$$

HOE'SCOMPOSITION FOR PRINTERS' ROLLERS.—This consists of glue and molasses, the proportions varying from 8 lbs. of glue in summer, to 4 lbs. in winter for each gallon of molasses. The glue should be placed ½ an hour in a bucket, covered with water, then pour the water off, and allow the glue to soften. Put it into a kettle and heat it until thoroughly melted; if too thick a little water may be added. Lastly, the molasses is added and well stirred in with the glue. When properly prepared an hour's boiling will be sufficient, as too much boiling is apt to candy the molasses. A late improvement consists in the addition of glycerine to the usual mixture. Swab the mould with oil before pouring.

CEMENT FOR PETROLEUM LAMPS.—Boil 3 parts of ressin with 1 part of caustic soda and 5 of water. The composition is then mixed with half its weight of plaster of Paris, and sets firmly in ¼ to ¾ of an hour. It is of great adhesive power, not permeable to petroleum, a low conductor of heat, and but superficially attacked by hot water.

TO DEDORIZE BENZINE.—Shake repeatedly with plumbate of soda (oxide of lead dissolved in caustic soda), and rectify. The following plan is said to be better. Shake repeatedly with fresh portions of metallic quick silver; let it stand for 2 days, and rectify.

SPECIFIC GRAVITY.—Is the density of the matter of which any body is composed, compared with the density of another body assumed as the standard, or 1000. This standard is pure distilled water for liquids and solids, and atmospheric air for gaseous bodies and vapors Thus as gold is 19 and silver 10 times heavier than water, those numbers 19 and 10 are said to represent the specific gravity of gold and silver. The heaviest known substance is iridium, used for pointing gold pens; its specific gravity is 23. The lightest of all liquids has a specific gravity of 0-6., it is called chimogene, and is made from petroleum, it is exceedingly volatile and combustible, being in fact a liquefied gas. Carbonic acid gas or choke damp is 500 times lighter than water, common air, 800, street gas about 2000, and pure hydrogen the lightest of all substances, 12,000 times. The heaviest substance has thus 23×12,000, or more than a quarter of a million times more weight than an equal bulk of the lightest; and the substance of which comets consist, has by astronomers been proved to be even several thousand times lighter than hydrogen gas.

To Galvanize Grey Iron Castings.—Cleanse the articles in an ordinary chaffing mill, which consists of a barrel revolving on its axis, containing sand; when the sand is all removed, take them out and heat one by one, plunging, while hot, in a liquid composed as follows 10 lbs. hydrochoric acid and sufficient sheet zinc to make a saturated solution. In making this solution, when the evolution of gas has ceased, add muriate, or preferably sulphate of ammonia, 1 lb., and let it stand till dissolved. The castings should be so hot that when dipped in this solution, and instantly removed, they will immediately dry, leaving the surface crystallized like frost work on a window pane. Next plunge them while hot, but perfectly dry, in a bath of melted zinc, previously skimming the oxide on the surface away, and throwing thereon a small amount of powdered sal ammoniac. If the articles are very small, inclose them in a wrought iron basket on a pole, and lower them into the metal. When this is done, shake off the superfluous metal, and cast them into a vessel of water to prevent them adhering when the zinc solidifies.

To Purify Petroleum or Kerosene Oil.—The distillate or crude burning oil is converted into ordinary burning oil by being placed in a tank when it is violently agitated by forcing air through it, and while thus agitated, 1½ to 2 per cent., sulphuric acid is added, after which the agitation is continued 15 to 30 minutes. The oil is then allowed to settle, when the acid and impurities are removed, and any acid remaining in the oil is neutralized. It is then taken to shallow bleaching tanks, where it is exposed to light and air, and allowed to settle. It is next heated by means of a coil of steam pipe running through it, to expel all gaseous vapours which will ignite at a temperature below 110° Fahr The oil is now called a *fire test* oil, and is ready to be barreled and sent to market. Kerosene oil is *decolorized* by stirring it up with 1 or 2 per. cent. of oil of vitriol, which will carbonize the coloring matter, then with some milk of lime or some other caustic alkali, settling, and re-distilling.

To Frost Polished Silver.—Cyanide of potassium 1 oz., dissolve in ½ pt. of water. Do not hold the silver in your hands, but use pliers made of lance wood or box wood, and apply the mixture with a brush to the polished surface.

TO RESTORE BURNT CAST STEEL.—Borax 1½ lbs., sal ammoniac ½ lb., prussiate of potash ¼ lb., rosin, 1 oz. Pound the above fine, add a gill each of water and alcohol, and boil all to a stiff paste in an iron kettle. Do not boil too long, or it will become hard when cool. The burnt steel is dipped while quite hot in the composition and slightly hammered.

YELLOW DIPPING METAL.—Melt together 2 parts of brass, 1 part copper, with a little old brass, and ¼ oz. tin to every lb. of copper. This alloy is almost of the color of gold coin.

SILVERING HOOKS AND EYES, &C.—The small iron articles are suspended in dilute sulphuric acid until the iron shows a bright clean surface. After rinsing in pure water they are placed in a bath of a mixed solution of sulphate of zinc, sulphate of copper and cyanide of potassium, and there remain until they receive a bright coating of brass. Lastly, they are transferred to a bath of nitrate of silver, cyanide of potassium and sulphate of soda, in which they quickly receive a coating of silver.

TO APPLY DECALCOMINE PICTURES.—Varnish the pictures carefully with the prepared varnish, (which can be obtained with the pictures), with an ornamenting pencil, being careful not to get the varnish on the white paper. In a few minutes the picture will be ready to lay on the panel, and the paper can be removed by wetting it, and when thoroughly dry, it should be varnished like an oil painting. Be particular to purchase only those transfer pictures which are covered with a gold leaf on the back, for they will show plainly on any colored surface, while the plain pictures are used only on white or light ground

COMPOSITION ORNAMENTS FOR PICTURE FRAMES, &C.— Mix as much whiting as you think will be required for present use, with thinish glue, to the consistence of putty; and having a mould ready, rub it well all over with sweet oil, and press your composition in it; take it out and you have a good impression, which you may set by to dry; or, if wanted, you may, before it gets hard, apply it to your work with thick glue, and bend it into the form required.

DRILL LUBRICATOR.—For wrought iron, use 1 lb. soft soap mixed with 1 gal. boiling water. It insures good work and clean cutting.

CEMENT FOR EMERY ON WOOD.—Melt together equal parts of shellac, white rosin, and carbolic acid in crystals; add the last after the others are melted. An unrivalled cement.

WEIGHT OF EARTH, ROCKS, &C.—A cubic yard of sand or ground weighs about 30 cwt.; mud, 25 cwt.; marl, 26 cwt.; clay, 31 cwt.; chalk, 36 cwt.; sandstone, 39 cwt.; shale, 40 cwts.; quartz, 41 cwt.; granite 42 cwt.; trap, 42 cwt.; slate, 43 cwt.

TO DETERMINE WEIGHT OF LIVE CATTLE.—Measure in inches the girth round the beast, just behind the shoulder blade, and the length of the back from the tail to the fore part of the shoulder-blade. Multiply the girth by the length, and divide by 144. If the girth is less than 3 feet, multiply the quotient by 11. If between 3 and 5 feet, multiply by 16. If between 5 and 7 feet multiply by 23. If between 7 and 9 feet multiply by 31. If the animal is lean, deduct $\frac{1}{20}$ from the result, or take the girth and length in feet, multiply the square of the girth by the length, and multiply the product by

3.36. The result will be the answer in pounds. The live weight, multiplied by 6.05, gives a near approximation to the net weight.

TO REPAIR THE SILVERING OF MIRRORS.—Pour upon a sheet of tin foil 3 drs. of quicksilver to the square foot of foil. Rub smartly with a piece of buckskin until the foil becomes brilliant. Lay the glass upon a flat table, face downwards, place the foil upon the damaged portion of the glass, lay a sheet of paper over the foil, and place upon it a block of wood or a piece of marble with a perfectly flat surface; put upon it sufficient weight to press it down tight; let it remain in this position a few hours. The foil will adhere to the glass.

PENCILS FOR WRITING ON GLASS.—Stearic acid 4 pts., Mutton-suet, 3 pts., wax 2 pts; melt together and add 6 parts of red lead, and 1 pt. purified carbonate of potassa, previously triturated together; set aside for an hour in a warm situation, stirring frequently; then pour into glass tubes or hollow reeds.

MODELLING CLAY.—Knead dry clay with glycerine instead of water, and a mass is obtained which remains moist and plastic for a considerable length of time, being a great convenience for the modeller.

ASPHALT FOR WALKS.—Take 2 pts., very dry lime rubbish, and 1 pt. coal ashes, also very dry, all sifted fine. In a dry place, on a dry day, mix them, and leave a hole in the middle of the heap, as bricklayers do when making mortar. Into this pour boiling hot coal tar; mix, and when as stiff as mortar, put it three inches thick where the walk is to be; the ground should be dry and beaten smooth; sprinkle over it coarse sand. When cold, pass a light roller over it; in a few days the walk will be solid and water-proof.

POLISHING POWDER FOR SPECULA.—Precipitate a dilute solution of sulphate of iron by ammonia in excess; wash the precipitate; press it in a screw press till nearly dry; then expose it to heat until it appears of a dull red color in the dark.

FACTS FOR GAS COMPANIES AND GAS CONSUMERS.—*Purifiers*—Dry purifiers require 1 bushel of lime to 10,000 cubic feet of gas, and 1 superficial foot for every 400 cubic feet of gas. *Wet purifiers* require 1 bushel of lime mixed with 48 bushels of water for every 10,000 cubic feet of gas. *Retorts*—A retort produces about 600 cubic feet of gas in 5 hours with a charge of about 1½ cwt. of coal, or 2800 feet in 24 hours; 1 ton of Wigan Cannel has produced coke, 1326 lbs.; tar, 250 lbs.; gas, 338 lbs.; loss, 326 lbs. Pictou and Sidney coal has produced 8000 cubic feet per ton; 1 lb. peat will supply gas for 1 hour's light. Exposed lights require about 5 cubic feet; internal lights require 4 cubic ft. per hour. Large burners require from 6 to 10 cubic feet per hour. A cubic foot of gas, from a jet $\frac{1}{33}$rd of an inch in diameter and height of flame 4 inches, will burn for 65 minutes. *Rosin Gas*—Jet $\frac{1}{33}$, flame 5 inches, 1¼ cubic feet per hour. In winter the average duration of internal lights per day is 5.08 hours; in summer it is 2.83, in spring it is 3.41; and in the fall 4.16. Street lamps in New York city consume 3 cubic feet of gas per hour. In some cities 4 and 5 cubic feet are consumed. Fish-tail burners for ordinary coal gas consume 4 to 5 cubic feet of gas per hour. *The standard of gas burn-*

ing is a 15 hole Argand lamp, internal diameter .44 inch, chimney 7 inches in height, consumption 5 cubic feet per hour, giving a light from ordinary coal gas of from 10 to 12 candles, with Cannel coal from 20 to 24 candles, and with the coals of Pennsylvania and Virginia of from 14 to 16 candles. *Loss of Light by Glass Globes*—Clear glass 12 per cent., half ground 35 per cent., full ground 40 per cent. The pressure with which gas is forced through pipes should seldom exceed 2½ inches at the works, or the leakage will exceed the advantages to be obtained from increased pressure. When pipes are laid at an inclination either above or below the horizon, a correction will have to be made in estimating the supply, by adding or deducting $\frac{1}{100}$ of an inch from the initial pressure for every foot of rise or fall in the length of the pipe. By experiment, 30,000 cubic feet of gas, sp. gr. ·42 were discharged in an hour through a main 6 inches in diameter and 22.5 feet in length, and 852 cubic feet, specific gravity. 398 were discharged under a head of 3 ins. of water, through a main 4 ins. in diam. and 6 miles in length. Loss of volume, if discharged by friction, in a pipe 6 in. diam. and 1 mile in length is estimated at 95 per cent. In distilling 56 lbs. of coal the volume of gas produced in cubic feet when the distillation was effected in 3 hours was 41.3, in 7 hours 37.5, in 20 hours 33.5, and in 25 hours 31.7. The time of explosion is about the 27th part of a second, and the resultant temperature 2474°. *Gas Engines*—In the Lenoir engines, the best proportions of gas and air are, for common gas, 8 volumes of air to 1 of gas, and for cannel gas 11 of air to 1 of gas. An engine having a cylinder of 4¼ inches diameter, and 8¾ inch stroke of piston, making 185 revolutions per minute, develops a power of half a horse.

To Remove Deposit of Carbon from Clay Retorts.—Leave the retort uncharged for 48 hours, or as long as can be spared. Put the lid on the mouth-piece so as to be closed at top, and open 2 or three inches at the bottom. Take out the stopper from stand pipe, so as to allow a current of air to pass through the retort and oxydize the carbon; use no bar. Put in a charge of coal after the retort has lain idle the number of hours required, and when it is withdrawn the carbon comes with it.

To Mend Iron Retorts.—Fire clay 15 lbs., saleratus, 1 lb. with water sufficient to make a thick paste. Apply to the broken part of the retort while at a good working heat, then cover it with a fine coal dust, and charge the retort for working.

To Stop Leaks in Clay Retorts When at Working Heat.—Five parts fire clay, 2 parts white sand, 1 part of borax pressed and ground. Mix the whole together with as much water as may be necessary to bring it to the consistence of putty. Roll it in the hands to a proper length and apply it over the crack, pressing it with a long spatula into the crack.

To Prevent Gas Meters From Freezing.—Half a pint of good glycerine is said to prevent the freezing of 1 gal. water, though at least double the proportion is preferable in the country, whatever the temperature in the winter may happen to be.

Magnetized Watch Works.—The only cure is to put in a gold or brass balance and new pendulum spring. The most intense heat will not eradicate the trouble.

Cement for Leather.—Bisulphide of carbon, 5 oz.; tick gutta percha, 1 oz. The latter is like thin curly shavings of leather and must be added à little at a time. Cork up tight, and it is fit for using in 10 or 12 hours.

To Repair Leakages in Fire Engine Hose.—Pass a round bar of iron into the hose under the leak, then rivet on a patch of leather, previously coated with marine glue.

Aquaria Cement.—Mix equal quantities of dry white lead and red lead to a paste with mastic varnish, and use as soon as mixed.

New Steam Packing.—Take long coils or continuous strands of flax or hemp loosely twisted, or better still, with scarcely any twist, saturate these coils in melted grease or tallow, and give them a good thorough coating with as much black lead or plumbago (finely pulverized), as the material will absorb. It is a most superior article.

Paper Friction Pulleys.—These superior mechanical contrivances are made by cutting pieces of pasteboard into a circular form, and of the desired diameter of the pulley, and placing them in layers one on the top of another, cementing properly with a good coat of glue between each layer, pounding or pressing them together as close as possible, and leaving a perforation in the centre of each, for the shaft. When you have got enough of these layers together to give you the proper breadth of pulley, allow the glue to harden, then turn it off to a smooth finish in a lathe. Secure each side of the pulley with a good stout iron flange large enough to cover the entire diameter, or nearly so, and with proper usage it will last a long time.

Quantity and Cost of Supplies for Horses and Lumbering Crews in the Woods.—The following figures have been kindly furnished for this work by the obliging manager of Messsrs. Gilmour's mill on the Gatineau, near Ottawa, Canada, and are most valuable as affording a basis for calculating the quantity and quality of the supplies required for men and horses engaged in this branch of industry. These calculations are the result of long experience in the business, and are based on actual consumption.

Quantity of	Oats for each span of horses,			51 lbs per day.	
"	Hay	"	"	40	"
"	Flour used by each man			1.80	"
"	Pork	"	"	1.22	"
"	Beef	"	"	0.85	"
"	Beans	"	"	0.33	"
"	Fish	"	"	0.12	"
"	Onions	"	"	0.13	"
"	Potatoes	"	"	0.47	"

Total daily consumption per man 4.92

Quantity of Tea used " 1½ lbs. per month.

The daily allowance of oats for each span of horses may appear large, but it must be remembered that the labour is extremely severe, and more hay will be required if any part of the oats is witheld. On making enquiry with reference to the item of molasses, so largely used by our lumbering friends in New Brunswick and Maine, the answer returned was that owing to the heavy cost of the commodity, it was entirely omitted from the list of supplies. The following exhibits the comparative value of Mess and Prime Mess Pork, calculated from actual consumption:—

Mess Pork.	*Prime Mess.*	*Mess Pork.*	*Prime Mess.*
$26	$18 80	$17	$12 24
25	18 08	16	11 51
24	17 35	15	10 78
23	16 62	14	10 05
22	15 89	13	9 32
21	15 16	12	8 59
20	14 43	11	7 86
19	13 70	10	7 13
18	12 97	9	6 40

1 Barrel Mess averages 37 lbs. grease, 6 lbs bones, when cooked
1 " Prime Mess 24 " 13 " "

Tough Type Metal.—Lead 100 parts, antimony 32 parts, tin 8.

To Repair Cracked Bells.—The discordant tones of a cracked bell being due to the jarring of the rugged uneven edges of the crack against each other, the best remedy that can be applied is to cut a thin slit with a toothless saw driven at a very high velocity, say 3 or 4,000 revolutions per minute, in such a manner as to cut away the opposing edges of the fracture wherever they come in contact. This will restore the original tone of the bell.

To Separate Tin from Lead.—If the lead and tin are in solution precipitate the former by sulphuric acid and the latter with sulphuretted hydrogen gas. In an alloy the lead will dissolve in nitric acid, leaving the tin as an oxide.

Ornamental Designs on Silver.—Select a smooth part of the silver, and sketch on it a monogram or any other design you choose, with a sharp lead pencil, then place the article in a gold solution with the battery in good working order, and in a short time all the parts not sketched with the lead pencil will be covered with a coat of gold. After cleansing the article, the black lead is easily removed by the fingers, and the silver ornament disclosed. A gold ornament may be produced by reversing the process.

Fusible Metal for Casts.—Bismuth, 8 parts, lead, 5 parts, tin 3 parts. It will melt at 200°, or under boiling water. For male casts use tin only.

Printer's Ink.—Linseed oil boiled to a thick varnish, and a sufficient quantity of vermillion or Prussian blue ground with it to give the required depth of color.

To Repair Leaks in Lead Pipes.—Place the point of a dull nail over the leak, give it a gentle tap with a hammer and the flow of water will cease.

To Improve Printer's Rollers.—The French composition prevents damp rollers and otherwise improves them. It is made as follows: for a 24 inch roller take Russian isinglass ¼ oz.; gelatine ¼ oz.; when the usual composition, (see page 106,) is ready for pouring, add the above to it, let all boil ¼ hour longer, and cast in the usual way.

On Melting and Refining.—In melting *Brass Gold*, urge the fire to a geat heat, and stir the metal with the long stem of a tobacco pipe to prevent honey combing. If *Steel* or *Iron filing* get into gold while melting, throw in a piece of sandiver the size of a common nut; it will attract the iron or steel from the gold into the flux, or, sublimate of mercury will destroy the iron or steel. To cause *Gold to roll well*, melt with a good heat, add a teaspoonful of sal ammoniac and charcoal, equal quantities, both pulverised, stir up well, put on the cover for 2 minutes and pour.

For Silversmiths, Sterling Silver.—1. Fine Silver 11 oz, 2 dwts., fine copper 18 dwts. 2. *Equal to Sterling*—Fine silver 1 oz., fine copper 1 dwt., 12 grs.. 3. *Another ditto*—Fine silver 1 oz., fine copper 5 dwts. 4. *Common Silver for Chains*—Fine silver 6 dwts., fine copper 4 dwts.. 5. *Solder for ditto*—Fine silver 16 dwts., fine copper 12 grs., pin brass 3 dwts, 12 grs. 6. *Alloy for Plating*—Fine silver 1 oz., fine copper 10 dwts. 7. *Silver Solder*—Fine silver 1 oz., pin brass 10. dwts., pure spelter 2 dwts. 8. *Copper Solder for Plating*—Fine silver 10 cwts., fine copper 10 dwts. 9. *Common Silver Solder*—Fine silver 10 ozs., pin brass 6 ozs. 12 dwts, spelter 12 dwts. 10. *Silver Solder for Enamelling*, $1 *per oz.*—Fine silver 14 dwts, fine copper 8 dwts. 11. *Ditto, for filling Signet Rings*—Fine silver 10 ozs., fine copper 1 oz. 16 dwts., fine pin brass 6 ozs 12 dwts., spelter 12 dwts. 12. *Silver Solder for Gold Plating*—Fine silver 1 oz., fine copper 5 dwts., pin brass 5 dwts. 13. *Quick Silver Solder*—Fine silver 1 oz., pin brass 10 dwts., bar tin 2 dwts. 14. *Imitation Silver*—Fine silver 1 oz., nickel 1 oz. 11 grs., fine copper 2 ozs. 9 grs. 15. *Another ditto*—Fine silver 3 ozs., nickel 1 oz. 11 dwts., fine copper 2 ozs. 9 grs., spelter 10 dwts. 16. *Fine Silver Solder for Filigree Work.*—Fine silver 4 dwts. 6 grs.. pin brass 1 dwt. 17. *Bismuth Solder.*—Bismuth 3 ozs. lead 3 ozs. 18 dwts., tin 5 ozs. 6 dwts.

USEFUL ITEMS FOR DAILY REMEMBRANCE.

Legal Brevities.—A note dated on Sunday is void. A note obtained by fraud, or from one intoxicated, is void. If a note be lost or stolen, it does not release the maker, he must pay it. An endorser of a note is exempt from liability, if not served with notice of its dishonor within 24 hours of its non payment. A note by a minor is void. Notes bear interest only when so stated. Principals are responsible for their agents. Each individual in partnership is responsible for the whole amount of the debts of the firm. Ignorance of the law excuses no one. It is a fraud to conceal a fraud. It is illegal to compound a felony. The law compels no one to do impossibilities. An agreement without a consideration is void. Signatures in lead pencil are good in law. A receipt for money is not legally conclusive. The acts of one partner bind all the others. Contracts made on Sunday cannot be enforced. A contract with a minor is void. A contract made with a lunatic is void. Written contracts concerning land must be under seal,

A TABLE OF DAILY SAVINGS AT COMPOUND INTEREST.

Cents per Day	*Per Year*	*In Ten Years*	*Fifty Year*
2¾	$ 10	$ 130	$ 2,900
5¼	20	260	5,800
11	40	520	11,600
27½	100	1,300	29,000
55	200	2,600	58,000
1.10	400	5,200	116,000
1.37	500	6,500	145,000

By the above table it appears that if a mechanic, or clerk saves 2¾ per day from the time he is 21 till he is 70, the total with interest will amount to $2,900, and a daily saving of 27½ cents reaches the important sum of $29,000. Save all you can in a prudent manner for a time of possible want, but act justly by paying your debts, and liberally by assisting those in need, and helping in a good cause.

On Profane Swearing—Let every man do his best to discountenance this abominable habit, and shun it as an accursed sin in every possible way. No respectable person will allow himself to be guilty of it. Business men who make a practice of it will find themselves avoided by the best class of customers, for I know that some persons can suffer no mental punishment equal to that inflicted by being compelled to listen to profane language. Besides, every man known as a profane swearer, will not be credited by those whose good opinion is worth having, even when he may be speaking the truth.

Act Well Your Part, Don't be Selfish.—Remember that it is by imparting happiness to others, and making ourselves useful, that we receive happiness. Stand by this truth, live it out, and always keep doing something useful for the common good, doing it well, and acting sincerely. Endeavour to keep your heart in the attitude of cherishing good will to all, thinking and speaking evil of no one, and always with a kind word for everybody. Selfishness is its own curse; it is a starving vice. The man who does no good gets none. He is like the heath in the desert, neither yielding fruit nor seeing when good cometh, a stunted dwarfish, miserable shrub. Let all your influence be exerted for the purpose of doing all you can for the common good, and individual welfare of every one.

Marriage Maxims.—A good wife is the greatest earthly blessing. A wife never makes a greater mistake than when she endeavours to coerce her husband with other weapons than those of love and affection. Those weapons are a sure pull if he has any thing human left in him. Forbear mutual upbraidings. In writing letters, during temporary separation, let nothing contrary to love and sincere affection be expressed, such letters from a wife have a most powerful emotional effect, sometimes little understood by those who write them. It is the mother who moulds the character and destiny of the child as to the exteriors, therefore let calmness, peace, affection, and firmness rule her conduct towards her children. Children are great imitators, whether they have scolding or peaceful mothers, they are generally sure to learn from the examples set before them, and thus the consequent joy or sorrow is trans-

ferred to other families, therefore let mothers take heed to their conduct. It is not possible to exercise judgment and prudence too much before entering on the married life. Be sure that the affections on both sides are so perfectly intertwined around each other, that the two as it were, form one mind, this requires time; and a thorough mutual knowledge on both sides. Marry in your own religion, and into a different blood and temperament from your own. Bend your whole powers to avoid depreciatory remarks, jibing and anger in every form, and specially avoid everlastingly dishing up any unsuccessful past action that was done from a good motive and with the best intentions at the time. Let nothing foreign to the spirit of love and mutual affection intervene to cause distance between husband and wife; to this end let self-denial rule over each, and reciprocal unselfishness. Avoid habitual fault-finding, scolding, &c., as you would perdition itself; many men tremble as they cross their threshold into the presence of scolding wives. Let husband and wife cultivate habits of sobriety, and specially avoid drunkenness in every form. What a dreadful spectacle it is to see a husband transformed into a demon, tottering homeward to a broken-hearted wife, whose noble self-sacrificing devotion to him seems to partake more of the nature of heaven than of earth. Never part even for a journey, without kind and endearing words, and as a kiss symbolizes union from interior affection, do not spare it on such occasions, repeating it when you return. In one word, let love rule supreme.

Children and Home Conversation.—Children hunger perpetually for new ideas. They will learn with pleasure from the lips of parents what they deem drudgery to learn from books, and even if they have the misfortune to be deprived of many educational advantages they will grow up intelligent if they enjoy in childhood the privilege of listening to the conversation of intelligent people. Let them have many opportunities of learning in this way. Be kind to them, and don't think it beneath you to answer their little questions, for they proceed from an implanted faculty which every true man and woman should take a great delight in gratifying.

Home after Business Hours.—Happy is the man who can find that solace and that poetry at home. Warm greetings from loving hearts, fond glances from bright eyes, and welcome shouts of merry hearted children, the many thousand little arrangements for comfort and enjoyment, that silently tell of thoughtful and expectant love, these are the ministrations that reconcile us to the prose of life. Think of this ye wives and daughters of business men! Think of the toils, the anxieties, the mortification and wear that fathers undergo to secure for you comfortable homes, and compensate them for their toils by making them happy by their own fire side.

Well Worthy of Imitation.—A worthy Quaker thus wrote:—"I expect to pass through this world but once. If therefore, there be any kindness I can do to any fellow being, let me do it now, let me not defer nor neglect it, for I will not pass this way again." Were all to act thus how many would be made happy!

Another Sensible Quaker.—A Quaker lately propounded the momentous question to a fair Quakeress, as follows; "Hum! yea

and verily; Penelope, the spirit urgeth and moveth me wonderfully to beseech thee to cleave unto me, flesh of my flesh, and bone of my bone." "Hum! truly, Obadiah, thou hast wisely said. Inasmuch as it is not good for man to be alone, lo, I will sojourn with thee."

TABLE CONVERSATION.—Instead of swallowing your food in sullen silence, or brooding over your business, or severely talking about others, let the conversation at the table be genial, kind, social and cheering. Don't bring any disagreeable subjects to the table in your conversation, any more than you would in your dishes. Avoid scandalizing people, and never cherish a jubilant feeling over the infirmities or misfortunes of others. The more good company you have at your table the better. Hence the intelligence, refinement and appropriate behaviour of a family given to hospitality. Never feel that intelligent visitors can be anything but a blessing to you and yours.

KEEP THE HOUSE CLEAN AND WELL VENTILATED.—A neat, clean, fresh aired, sweet, cheerful, well arranged house, exerts a moral influence over its inmates, and makes the members of a family peaceable and considerate of each other's feelings; on the contrary, a filthy, squalid, noxious dwelling, contributes to make its inhabitants selfish, sensual, and regardless of the feelings of others. Never sleep in a small close bedroom, either during summer or winter without free ventilation from door or windows, unless otherwise supplied with abundance of fresh air. It will be seen that a person's house usually corresponds to his character.

SAFE BUSINESS RULES.—BUSINESS MEN, in business hours, attend ONLY to business matters. SOCIAL CALLS are best adapted to the SOCIAL CIRCLE. Make your business known IN FEW WORDS, without loss of time. Let your dealings with a stranger be MOST CAREFULLY considered, and TRIED FRIENDSHIP duly appreciated. A MEAN ACT will soon recoil, and a MAN OF HONOUR WILL BE ESTEEMED. Leave "TRICKS OF TRADE" to those whose education was never completed. Treat ALL with respect, CONFIDE IN FEW, WRONG NO MAN. Be never afraid to say No, and ALWAYS PROMPT to acknowledge and rectify a wrong. Leave nothing for to-morrow that SHOULD be done to-day. Because a friend is polite, do not think his TIME is valueless. Have a PLACE for every thing, and EVERY thing in its place. To preserve LONG friendship, keep A SHORT CREDIT; the way to GET CREDIT is to be punctual; the way to PRESERVE IT is NOT TO USE it much. SETTLE OFTEN; have SHORT accounts. Trust no man's APPEARANCES, they are often deceptive, and assumed for the purpose of obtaining credit. Rogues generally dress well. The rich are generally PLAIN MEN. Be WELL SATISFIED before you give a credit, that those TO WHOM YOU GIVE IT are SAFE MEN to be trusted.

APPENDIX TO "THE ARTIZAN'S GUIDE."

ON CORRESPONDENCES.

By reference to page 265 it will be seen that something was stated regarding correspondences, together with an allusion to the appendix for farther information. The amplitude of the subject being very great, no more can be promised here than a very abridged statement by way of illustration. Not being aware that the subject has ever been alluded to in connection with a work of this kind, perhaps some will be inclined to attach a certain amount of blame on account of introducing it here, as there is *apparently* but very slight relationship between the subjects treated of throughout this work and the topic under consideration. But inasmuch as it is believed that its consideration will fulfil a much needed use and command the approbation of all good men, the censure of others is but little regarded in comparison Furthermore, the discrepancy is only apparent, for many things mentioned in this book, together with thousands of other things, will be comprehended just in proportion as correspondences are understood; consequently any effort that tends to dissipate the obscurity, and enlighten the darkness, with which, as regards this subject, many minds are beclouded, must be productive of good, while the knowledge in question will enable us to account for many of the phenomena of the visible creation, such as chemical affinities, the constitution and qualities of different kinds of metal, and their action on each other, besides suggesting innumerable instructive thoughts on other interesting questions of a purely natural kind: nevertheless the writer desires to state that his motive for considering the subject in this place, is a desire to give a few examples of the working of the principle as an unerring rule in unfolding the true meaning of the Sacred writings, for, strange as the assertion may appear to many, the meaning of the Divine Word as to its true or internal sense, can be evolved in no other way. It should be known that the WORD being Divine, is composed in a manner different from all other writings whatsoever, being written by pure correspondences, for which reason, through the use of emblems, symbols, types, and representatives, it contains and embraces within its bosom things which regard the Lord, his heaven, the Church, man, and the things of love and faith, even when such subjects do not in the least appear in the letter while it is being read, for it is a Divine truth, that there are indefinite things in each expression of the *Word*, which appears to man so simple and rude; yea, there is contained therein more than man can ever comprehend, because it is the embodiment of Infinite wisdom, and is as to its inmosts, the Lord Himself. John i-1., Rev. xix, 18 Treat with the utmost reverence therefore, I pray you, whatever has relation to the Word of GOD, for by so doing you do honour to that SACRED NAME which should never be taken in vain. Of all the abounding iniquities of society, none are more destructive of the germs of goodness implanted by our Heavenly Father in man's heart, and none ministers less gratification to the depraved cravings of fallen man, than the profanation of the NAME and WORD of the everblessed GOD. Let every one discountenance this appalling enormity, and beware of it is as he would shun eternal ruin, not only on account of its infamous character as a sin against GOD, but also out of common regard for the feelings of our neighbours.

The science of correspondences unfolds those spiritual laws in accordance with which the word of God is written. The word *correspondence* is derived from the Latin terms *con* and *respondee*, and means, radically, to answer with or to agree. It will serve our purpose here to define it as the appearance of the internal in the external, and its representation there; in other words, internal and spiritual things are mirrored forth and represented in external and natural forms. The WORD throughout, is written with a constant reference to an exact and immutable relation between spiritual and natural things. Various descriptions are there given of the

sun, moon, and stars; of the earth with her mountains, valleys and rivers; of men, animals and plants, gold and silver, brass and iron, and a thousand other things which appear in the natural world. In all these descriptions there is a constant reference to the internal and spiritual causes from which these things exist, and to which they correspond. The WORD, in its literal sense, is thus wrought together with infinite skill, constituting a permanent receptacle of divine and spiritual things. Within are the living principles, the *spirit* and *life* of the Word, of which it is said, "The words I speak unto you, they are *spirit* and they are *life*" John vi. 63. The science of correspondences is to the Word of GOD what the mathematical science is to the phenomena of the material universe. It reveals order, harmony, beauty and Divine perfection in the midst of what seemed to be disorder, uncertainty, inextricable confusion and even contradiction. It is a most melancholy spectacle at this day to see professed expounders of the Word tell their hearers that the Bible is full of errors, that such and such passages contradict each other, and then proceed forthwith to communicate a vast amount of erudite self-derived intelligence in the shape of glosses, comments and explanations, with the only effect of causing real confusion where there never was any, whilst a knowledge of this heavenly science, for such indeed it is, would have enabled them to harmonize all apparent discrepancies at once.

Not so were the men of the most Ancient Church described in those Divinely composed allegories in the beginning of Genesis, previous to that awful apostacy and declension from goodness described under the representation of a flood which swept over the whole earth. They were gifted with such an intuitive knowledge from above, that they could, as it were, read God's word in His WORKS, and learn and think of heavenly things through and by means of the contemplation of corresponding earthly things. For example, when with the natural eye they beheld a mountain, instantly the emotions of their minds would assume a corresponding elevation towards the LORD, for by a mountain in the most Ancient Church was signified the LORD, and all that is celestial from Him, as the good of love and charity; the most ancient people, and all the ancients, even the Gentiles, worshipped on mountains from this origin. Hence it is written, "I will lift up mine eyes to the *mountains* (or hills), from whence cometh my help, my help cometh from the LORD, which made heaven and earth," Ps. cxxi. We may see from this the true reason why the blessed REDEEMER taught the people from mountains, ascended up into high mountains, and abode in mountains to such an extent as is recorded of Him in the gospels. For the sake of farther illustration it may be proper in this place to adduce a harmony of passages where mountains are mentioned, together with the internal sense signified by them. All the high *mountains* covered with the waters of the flood (Gen. vii. 19.) denotes that all the goods of charity were extinguished by falses and persuasions of the false, or what is the same, overflowing wickedness, The ark of Noah resting upon the *mountains* of Ararat, [Gen, viii, 4, 5], denotes the first light after temptation, which is from charity. The children of Shem dwelling from Mesha, as thou goest unto Sephar, a *mount* of the east, (Gen. x. 80.), denotes worship from the truths of faith extending to the good of charity as its end. Abraham's removal unto a *mountain* on the east of Bethel (Gen. xii. 8), denotes the progression of celestial love with which the LORD was imbued in infancy, for by Abraham in the word is represented the LORD as to the divine celestial principle, or divine good. They that remained flying to the *mountains* after Abraham's victory in Siddim (Gen. xiv. 10), denotes the love of self and the world against which the LORD fought from his love for the whole human race. Lot said to ascend from Zoar and dwelling in a cave in the *mountain* (Gen, xix, 80] denotes the obscure good of those who are without the truths of faith. Jacob sacrificing a sacrifice in the *mountain* (Gen. xxxi. 54), denotes worship from the good of love. The angel of the LORD appearing to Moses in the *mount* of GOD (Ex. iii. 2), denotes the divine human manifested in the good of love; ye shall serve God upon this *mountain*, said to Moses (Ex. iii. 12), denotes the perception and acknowledgement of the Divine from love. Moses to stand on the top of the *mount* with the rod of GOD in his hand, during the battle with Amalek, denotes the conjunction of truth divine with the good of charity, and truth in power from good; Israel prevailing when Moses raised his hand and Amalek prevailing when he let down his hand, denotes that the victory is with those who are in the truth and good of faith when they look upwards to the LORD; but that the false overcomes them when they look down to self and the world, for Amalek represents interior evil. Israel to be planted in the *mountain* of the LORD's inheritance, (Ex. xv. 17,) denotes regeneration, and heaven, from the life of truth and goodness. The Israelites encamped at the *mount* of GOD (Ex. xviii. 5], denotes the new arrangement of truths when about to be conjoined with good in the second stage of regeneration. The LORD came from Sinai, He shone from *mount* Paran (Deut. xxxiii. 2), denotes the proceedure of Divine truth or the law, from Divine good. The *mountains* filled with horses and chariots of fire round about Elisha (2 Kings vi. 17), denotes doctrinals good and true from the Lord. The *mountains* shall bring peace and the little hills by righteousness (Ps. lxxii. 3), denotes love to the Lord and the neighbour, such as it was in the most ancient church. Upon every lofty *mountain*, and upon every high hill, rivers and streams of water, (Isa. xxx, 25), denotes the goods of love and charity, and the truths of faith from them, for, rivers and streams of water signify truths; like one going to the *mountain* of the LORD, to the Mighty One of Israel (Isa. xxx. 29), denotes the LORD as to the good of love and the good of charity. Get thee up into the high *mountain*, lift up thy voice with strength (Isa. xl. 9; xlii. 11), denotes the worship of the Lord from love. He that putteth his trust in me shall possess the land, and shall inherit my holy *mountain*, (Isa. lvii. 13), denotes the Lord's Kingdom where all is love and charity. The glory of the Lord upon the *mountain* east of the city (Ezek. xi. 23), denotes the sphere of celestial love from the LORD. The house and the top of the *mountain* made holy (Ezek. xliii. 12), denotes the Lord's celestial kingdom from the good of love. Judah called a *mountain* in a field, (Jer. xvii. 3), denotes the principle of celestial love in the LORD's Kingdom represented by them. The *mountain* of the congregation in the sides of the north (Isa. xiv. 13), denotes the obscure state where the influx of good, which flows in with light from the LORD, is terminated. Four chariots going out from between two *mountains* of brass (Zec. vi. 1–8), denotes the precedure of doctrinals from the good of love to the Lord and love to the neighbor in the natural degree. The *mountains* shall distil sweet wine and the hills shall melt, when captive Israel is restored (Amos ix. 13), denotes the good of love and charity when the spiritual church is delivered from falses. The LORD of hosts came down to fight for *mount* Zion and for the hill thereof (Isa. xxxi. 4) denotes the omnipotence of divine good and divine truth. Contend with the *mountains* and let the hills hear thy voice (Mic vi. 1), denotes truth speaking with those who are elate of heart in self-love, and with those who are in charity. And it shall come to pass in the last days that the *mountain* of the LORD's house shall be established in the top of the *mountains* and shall be exalted above the hills and all the nations shall flow unto it, and many people shall go and say, Come ye, and let us go up to the *mountains* of the LORD and to the house of the GOD of Jacob, and He will teach us His ways, and we will walk in His paths, (Isa. ii. 2–3). These words are spoken of the New Church to be established by the LORD; by the mountain of the LORD, which shall then be established in the top of the mountains, is understood Zion; and by Zion, is signified the celestial church, and love to the LORD which is communicated to those who belong to that church, that this is the primary principle of the church, and that it shall increase and gain strength, is signified by its being in the top of the mountains, and exalted above the hills; that they who are principled in the good of love shall acknowledge the LORD, and accede to the church, is signified by all nations flowing to that mountain, nations signifying those who are in celestial good, which is the good of love to the LORD, and people, those who are in spiritual good, which is the good of charity towards the neighbor. They of the south shall possess the *mount* of Esau, (Obad. 19), denotes the good of love with those who are in the light of truth. His feet shall stand in that day upon the *mount* of Olives, and the *mountain* shall divide, etc. (Zec. xiv. 4), denotes the advent of the LORD in the good of love and *charity, and the church* formed by such goods receding from the Jews to *the nations. The LORD set* upon a high *mountain* and upon a pinnacle of

the temple, by the devil, denotes the extreme temptation combats that he sustained against the loves of self and the world, thus against hell. Let them which be in Judea flee into the *mountains* (Matt. xxiv. 16), denotes salvation in love to the LORD and charity to the neighbor. They shall say to the *mountains*, Fall on us, and to the hills, cover us (Rev. vi. 16), denotes the state of the evil unable to bear the LORD's presence. A great *mountain* burning with fire cast into the midst of the sea (Rev. viii. 8), denotes the love of self in the scientifics of the natural man. From the examples it may be seen that there is an opposite side from love and goodness, when evil is treated of, for who does not know that there are mountains of pride and self-love of a very different kind from the love of the LORD and the neighbor? Other instances could be noted, but enough has been brought forward satisfy the present purpose.

Mention has been made of those ancestors of the human race who existed in the times of primitive integrity, happiness, purity and goodness. Not without the best of reasons did the ancients speak of that period as the GOLDEN age. In modern times, for a similar reason, we speak of the *golden* rule, a heart of *gold*, *golden* fruit, *golden* opinions, *golden* opportunity, etc., and no one is ever at a loss to perceive the correspondence existing between the symbol and the preciousness of the thing or quality represented by it. The nature and qualities of gold are well known. Its red, bright color, corresponding to that of burning fire, is symbolic of love or goodness, as is also the inherent warmth of the metal. No uncombined acid can corrode or dissolve it, acids corresponds to truth falsified, which in other words is evil or wickedness, so "charity suffers long and is kind." The most intense heat has no further effect on gold than to still further purify it, while its intrinsic value renders it a most proper emblem of that desirable quality which it is used to represent or symbolize in the WORD of GOD, viz., that of the good of love from the LORD. Silver in the internal sense of the word signifies truth, and in an opposite sense, the false. From this correspondence we can understand how the solution of silver used in photography is so sensitive to the rays of light, for natural light corresponds to spiritual light, which is the veriest divine truth, or that True Light which lighteth every man that cometh into the world. The *color* of silver is also in correspondence with the resplendency of light. Regarding gold and silver it may be well to state that in the Word they stand in a sort of mutual relation to each other, representing respectively love and wisdom, charity and faith, goodness and truth, will and understanding: the affections, or the feminine principle, and the intellectual, or the masculine principle. From this correspondence arises the mutual affinity these metals have for each other in the numerous intermixtures and appliances in the various arts and manufactures of the world. Inferior metals, such as brass, iron, etc., are used in the WORD to denote a lower degree of goodness and truth. We will now approach the sacred writings to see to what extent these remarks will be confirmed. The river of Eden encompassing the whole land of Havilah, where there is *gold* and precious stones (Gen. ii, 11, 12) denotes the state of the celestial man as to love and faith. Abram's being very rich in *silver* and *gold* (Gen. XIII. 2) denotes the state of the LORD in youth as to celestial good and truth. The Israelites borrowing jewels of *silver* and jewels of *gold* and raiment of the Egyptians (Exodus XII. 35) denotes scientific truths and goods taken away from the evil, and acquired by those who are of the spiritual church. The people offering *gold* and *silver*, and brass, and blue and purple, etc., for the works of the tabernacle, denotes interior things collated and disposed in externals, where they are represented. The *gold* of the ark, and the border of *gold* round about it, denotes good in the inmost, and the common sphere of good which proceeds from the LORD, and contains all. The mercy seat and the cherubim of *gold* denotes the hearing and reception of worship, and approach to the LORD from the good of love. The table of shew bread covered with *gold*, and the border of gold round about it, denotes the reception of all that conduces to the spiritual life in good, and the sphere of good *affording* protection from evil. The candlestick, its branches, etc., all of *gold* denotes all mental illumination, and intelligence, or the truth of faith *proceeding* from good. The couplings for the curtains of gold, denotes the *whole* connection and conjunction of truths, thus the whole order and

ny of heaven, preserved by the good of love. The boards of cedar
d with *gold* denotes the whole merit and good of works, thus all the
hat sustains heaven, from the good of love, thus from the LORD.
ue, the purple, and scarlet and fine linen of the ephod, embroidered
r with *golden* thread, denotes the universal prevalence of love, and
manifestation of charity and faith imbued therewith. The sockets
onyx stones made of *gold*, and the chains of *gold*, denotes the sub-
e and coherence of all things in the memory grounded in good.
stones of the breastplate set in *gold*, its rings and chains of *gold*,
all the goods and truths of the internal man proceeding from the
good, surrounded by the sphere of good, and their indissoluble
ction thereby. The bells of *gold* upon the border of the robe of
denote all that is heard and perceived of the church, thus all doc-
nd worship to be from good. The plate of *gold* engraved with
ness to the LORD" upon Aaron's forehead, denotes illustration and
n proceeding from the divine good of the LORD. The altar of
e covered with *gold* denotes the elevation or hearing and reception,
vorship rising from love and charity. Bezaleel, of the tribe of Judah,
and inspired to do these works for the tabernacle, to work in *gold*
lenotes those who are in the good of love receiving the divine
and their exceeding wisdom. In the opposite sense, the ear-rings
given to Aaron to make the *golden* calf, denote the delight of ex-
loves, which are the loves of self and the world, rendering worship
ous, thus the good of the external man instead of the good of love,
ine good, is represented. *Gold* signifies spiritual good, much fine
elestial good. (Psa. XIX. 10.) I counsel thee to buy of me *gold*
n the fire, that thou mayest be rich, (Rev. III. 18), denotes the
f celestial love derived from the LORD. *Gold* and precious stones
XVII. 4), denotes divine spiritual good, and divine spiritual truth,
lerived from the Word. How is the *gold* become dim, how is the
ine *gold* changed. (Lam. IV. 1), denotes the spiritual and celestial
of the church lightly esteemed through declension into evil. The
us Sons of Zion comparable to fine *gold*, (Lam. IV. 2), denotes those
re in wisdom from divine truths. *Gold*, *brass*, and *wood*, (Isa.
, represent the three celestial principles, the inmost principle is
nted by gold, the inferior by brass, and the lower by wood. The
the *gold* and *silver* vessels belonging to the temple of Jerusalem at
zzar's feast, while they praised the gods of gold, and of silver, of
of iron, of wood, and of stone, (Dan. v. 2,3,4), denotes the profana-
the knowledges of good and truth by those who are in falses, his
m being divided, signifies the dissipation of goods and truths,
himself being slain that night, signify the privation of the life of
nd truth, consequently, damnation. And the street of the city was
old, as it were transparent glass. (Rev. XXI. 21.) By the city, or
erusalem, is meant the LORD's New Church as to every thing per-
to it interiorly considered, or within the wall; by gold is signified
od of love from the LORD, and like unto pure glass, signifies pellu-
transparent from divine wisdom, and since the latter appears in hea-
light, and flows from the LORD as a sun, just as natural light flows
he natural sun; by like unto pure glass is signified flowing in toge-
ith light from heaven from the LORD. Regarding the LORD's
it is written, But who may abide the day of His coming? and who
tand when he appeareth? for He is like a refiner's fire; and he shall
refiner and purifier of silver, and he shall purifiy the sons of Levi,
rge them as *gold* and *silver*, that they may offer unto the LORD an
g in righteousness. Then shall the offering of Judah and Jerusalem
sant unto the Lord, as in the days of old, and as in former years
II. 3, 4). By Levi in a supreme sense is signified love and mercy, in
tual sense, charity in act; consequently the sons of Levi signify those
e in the affection of truth and live in the good of life. The name
s *to adhere*, by which in the Word, is signified conjunction through
y the refiner's fire is denoted temptation, whereby is effected puri-
n, which is here meant by purifying and purging them as gold and
By Judah is signified the Lord's celestial church, or those who
e *Lord above* all things, and by Jerusalem those who are in neigh-

bourly love, the offering they will bring unto the LORD is faith and charity, by the days of old and former years are meant the ancient churches, and the states of the worship of the LORD at that time. It is obvious that the sons of Levi mentioned in this passage cannot mean those who were officiating as priests during the time of our REDEEMER'S incarnation, for they were of that outrageously wicked crew who wilfully crucified the LORD of Glory. In the internal sense of the Word the twelve tribes of the children of Israel signify the church as to all its goods and truths; the same is signified by the twelve disciples of the Lord, and by the twelve gates and twelve foundations of the New Jerusalem, as it is stated regarding these last, that names were written thereon, which were respectively, the names of the twelve tribes of Israel and those of the twelve apostles of the Lamb. Jerusalem adorned with *gold* and *silver*, (Ezek. XVI. 13), the temple with its *gold* and *silver* claimed as the LORD'S, (Hag. II. 8) denotes the church gifted with wisdom and intelligence, or celestial and spiritual knowledge. *Gold* and *silver* made into images of men, and whoredom committed with them, (Ezek. XVI. 17), denotes profanation predicated of celestial and spiritual knowledges. The ships of Tarshish to bring *silver* and *gold*, (Isa. LX. 9), denotes knowledges when the LORD'S kingdom is established, by which truths and goods are acquired. He who is without *silver* invited to buy and eat, denotes such as are in ignorance of truth, but in the good of charity. *Silver* and *gold* gotten by Tyre (Ezek. XXVIII. 4, Joel III. 5) denote intelligence, or what is the same, truths and wisdom. *Silver* purified seven times (Ps. XII. 6), denotes divine truth. It is hoped that these examples will suffice to elucidate the statements made regarding the symbolic or representative sense of gold, silver, etc., in the Word.

As regards the correspondence of the sun, moon, and stars, it will be seen from what follows that these natural luminaries are also used by the Divine AUTHOR of the Word to represent spiritual and heavenly things, and in an opposite sense, things that are evil. The SUN, in the Word when the LORD is spoken of, signifies his divine love, and at the same time His divine wisdom. Forasmuch as the LORD with respect to His divine wisdom, is meant by the sun, therefore the ancients in their holy worship turned their faces to the rising sun, and also their temples, which practice is still continued. The MOON, in the Word signifies the LORD in reference to faith, and thence faith in the LORD. Stars, in a supreme sense, signifies knowledge concerning the LORD, hence stars signify intelligence of a spiritual kind, or the knowledge of good and truth, which is true wisdom. These statements will now be confirmed from the Word. "And He shall be as the light of the morning when the *sun* riseth, even a morning without clouds, as the tender grass springing out of the earth by clear shining after rain" (II. Sam. xxxiii., 4,). The light of the morning when the sun riseth, signifies the divine truth proceeding from the LORD as a SUN, a morning without clouds denotes the purity of that truth, rain signifies its influx, and the tender grass springing out of the earth signifies intelligence, and reformation thence originating, for these are signified by grass, because grass springs out of the earth by virtue of the sun of the world after rain, and intelligence is from the LORD as a SUN by the influx of divine truth. MORNING is used in the Word to denote every particular coming of the LORD, or when there is faith and love in the church, the *evening* or night denotes a time or state in which these are wanting. "Blessed of the LORD for his land, for the precious things of heaven, for the dew, and for the deep that coucheth beneath, and for the precious fruits brought forth by by the *sun*, and for the precious things put forth by the *moon*" (Deut. xxxiii. 13, 14.]. This particular blessing was pronounced on Joseph, for the reason that by Joseph are understood the spiritual celestial, who are the highest or supreme in the spiritual kingdom. By his land is signified that Kingdom, likewise the church thence derived. By the precious things of heaven, the dew, and the deep that coucheth beneath, are signified things that are spiritual celestial in the internal and external man. By the precious *things* brought forth by the sun and the precious things put forth by the moon, are signified all things which proceed from the LORD'S celestial *kingdom*, and all which proceed from His spiritual kingdom, consequently all the goods and truths which are thence derived. "Praise ye the LORD, praise ye Him all His hosts. Praise ye him sun and

, praise Him, all ye *stars* of light" [Psa. cxlviii. 2, 3]. Here by
sing the LORD is signified to worship Him. By the angels are signified
e who are in divine truths from the good of love, for all such are
ls. By all His hosts are signified goods and truths in their whole
pass. By the sun and moon are signified the good of love, and the
ı from that good. By the stars of light are signified the knowledge of
h from good. Inasmuch as man worships the LORD from those things
ch he receives from the LORD, thus from the goods and truths that
n him, and as it is also by virtue of such things that man is man, it is
efore said to such things namely, to the sun, moon, and stars, by
h are signified goods, truths, and knowledges of truths, that they
ld worship the LORD. It is clear that the command is not addressed
ose luminaries which enlighten the natural world, for how can such
gs offer praise and worship? And GOD made two great lights, the
ter light to rule the day, and the lesser light to rule the night, He
e the *stars* also [Gen. 1. 16]. The subject treated of in this chapter is
ew creation or regeneration of man, that is of those who constituted
Most Ancient church which is here described in the literal sense of the
d by the creation of the heavens and the earth, those who imagine that
description applies to the creation of the natural universe are much
ived, for how could day and night, or light have an existence previous
e creation of the sun, which according to this account did not come
being until the fourth day? Or how could the earth bring forth grass
e herb yield seed, or the fruit tree yield fruit after his kind, before
un of nature came into being? These and many other objections
been brought forward by infidels and scoffers, against the authenticity
e Word, and by many others who would consider themselves sorely
ieved by having these terms applied to them, many who are indeed
est seekers after truth. Let all such know that the Word of GOD as
led to us, and the works of GOD as made known to us through those
ties with which He has endowed us, are never in conflict and never
radict each other, but are always in heavenly correspondence and
tial harmony one with the other. GOD'S love in the will, and His
in the understanding, are here called two great lights, and after-
ls love is called a greater light, and faith a less, and it is said of love
it shall *rule by day*, and of faith that it shall *rule by night*. The Most
ent church acknowledged no faith but love itself; and the universal
en is of love, no other life being existent in heaven but the life of love.
ı love is derived all heavenly happiness, which is so great that no
e of it admits of description, or can ever be conceived by any human

Those who are under the influence of love, love the LORD from the
, but yet know, declare, and perceive, that all love, and consequently all
which is of love alone, and thereby all happiness, come only from the
and that they have not the least of love, of life, or of happiness, from
selves. The profundity of the Word is such that as to its inmost sense
s not treat in the least of natural things, but only makes use of them
present and symbolize things that are spiritual, as may be seen from
llowing in reference to a consummated church, as the end of the age,
he end of the world" as it is erroneously translated in the authorized
on. It is written, "Immediately after the tribulation of those days shall
un be darkened, and the *moon* shall not give her light, and the *stars*
fall from heaven, and the powers of the heavens shall be shaken;
here shall appear the sign of the Son of Man in heaven; and then
all the tribes of the earth mourn, and they shall see the Son of Man
ng in the clouds of heaven with power and great glory. And he shall
his angels with a great sound of a trumpet, and they shall gather
her his elect from the four winds, from one end of heaven to the other".
t. xxiv. 29-31). By all these expressions are meant spiritual things re-
g to the Church, of whose final state or period they are spoken, for in the
ual sense, by the sun which shall be darkened, is meant love to the
; by the moon which shall not give her light, is meant faith towards
, by the stars which shall fall from the heavens is meant the knowledge
odness and truth. Every intelligent person will know that it is no
possible for the stars in the firmament to fall to the earth, than it
be for a million of worlds to fall on a pebble by the sea shore. By

the sign of the Son of Man in heaven, is meant the appearance of
truth in the Word from Him; by the tribes of the earth whicl
mourn, is meant the failure of all truth which is of faith, and of a
which is of love; by the coming of the Son of Man in the clouds of
with power and great glory, is meant the presence of the LORD
Word, and revelation ; by the clouds of heaven is signified the liter
of the Word, by power and great glory is meant its internal sense,
has reference solely to the LORD and His kingdom, in each and
passage, and from this, that sense derives its power and glory ;
angels with a great sound of a trumpet is meant heaven. whence
truth comes, by gathering together the elect from the four winds, fr
end of heaven to the other, is meant a new heaven and a new Church
formed of those who have faith in the Lord and live according
precepts. "Behold the day of the LORD cometh, for the *st*
heaven and the constellations thereof shall not give their light, t
shall be darkened in his going forth, and the *moon* shall not cau
light to shine, (Isa. xiii., 9-10). I will cover the heaven and m
stars thereof dark, I will cover the *sun* with a cloud, and the *moo*
not give her light. (Ezek. xxxii. 7-8.) The day of the LORD is ne
sun and *moon* shall be darkened, and the *stars* shall withdraw the
ing, (Joel. iii, 14-15.) The same idea is visible in all these passage
the day of the LORD, is meant His advent, which was at a time whe
was no longer any good of love or truth of faith remaining in the C
or any knowledge of the LORD, therefore it is called a day of darkn
thick darkness. From want of knowledge respecting the spiritua
of the Word, as unfolded by the science of correspondences, many
tians at the present day suppose that the LORD will appear in the
of the atmosphere, and, accompanied by the whole of the heavenl
will be visible to the natural eye, when the dead bodies and moulderi
of all who have ever lived on the earth will be raised (at the sound
archangel's trumpet), out of their graves, and wherever else their du
be scattered, no matter what form they may have assumed. It is t
this inconceivable mass of corruption will be raised up, and the
each be re-implanted, the judgment set, and the books opened, ea
being judged out of what is written in those books, just as if the
cient ONE could possibly require a set of books; that then the ear
all that is therein will be burnt up, the stars fall from heaven and t
and moon be blotted out from the creation. Many good people
tain these thoughts because things are thus described in the letter
Word, but the case is far otherwise, for it is most true that by *clouds*
Scripture is meant the Word in the letter, for it is written that "His st
is in the *clouds*," that "His truth reacheth unto the *clouds*," tha
maketh the *clouds* His chariot," that "His faithfulness reacheth u
clouds,' that the "*clouds* are the dust of His feet; that thick cloud
covering to Him. In his unclouded purity, He is described as a "
ing without *clouds*.' These and many other similar expressions ca
be predicated of the clouds of nature, but that they are true of the
is most clearly manifest; hence, when the LORD is spoken of as com
the clouds of heaven, a literal or personal coming is not to be unde
or expected, but instead thereof, on unfolding or opening of that sp
or internal sense of the Word which has hitherto lain so deeply co
within the clouds of the letter, and which as to its inmost is the
Himself, and though the announcement may seem premature, this c
has actually taken place during these latter days by and through t
closure of that sense to mankind. But more regarding this in
follows. When rightly understood, the Word teaches that th
resurrection that will ever be accorded to man's body consists in the
up of the soul or spiritual body, which takes place immediatel
natural death, and after death, the judgment. This does not take p
this world, but in the spiritual world into which every one enters a
death of the body, the books which will then be opened, and from wh
will be judged, signify the interiors of the mind of man, because i
are written all things appertainig to his life.

Another resurrection is indeed spoken of in John v 25., as foll
"*The hour* is coming, *and now* is, when the dead shall hear the

the Son of GOD, and they that hear shall live; plainly indicating a resurrection from the graves of carnality and the love of self and the world, which is spiritual death, to the life of spiritual mindedness, and the love of the LORD and the neighbor, which alone is true life. This resurrection must take place during man's life in the body, it cannot take place after death, for such as the ruling love is in this life it will irrevocably remain to all eternity. It is also a great fallacy to infer from any description in the Word, that this earth will ever be destroyed, no such doctrine being ever taught or inculcated therein. In the modern discoveries of geology, the testimony of GOD through His works, points unerringly to the sublime truth that Infinite power has been constantly engaged during countless millions of ages in preparing the earth for the abode of man. It has been created that the human race might exist, and thence heaven, for the human race is the seminary of heaven, and when infinite Love is satisfied to its fullest capacity with intelligent and rational beings on whom it may shower its blessings and celestial beatitudes, for it creates them for no other end, then, just so soon, but no sooner, will the procreations of the human race cease, and the world become a blank in the creation. The most ample testimony is not wanting to prove that it was He who laid the foundations of the EARTH, that it should not be removed for EVER," Ps. CIV., 5 "He built his sanctuary like high palaces, like the EARTH which he hath established FOR EVER," Ps. LXXVIII 69. "The WORLD also is established that it CANNOT BE MOVED." Ps. XCIII. 1. "Say among the heathen that the Lord reigneth; the WORLD also shall be established that it SHALL NOT BE MOVED, Ps. XCVI. 10. "One generation passeth away, and another generation cometh, but the earth ABIDETH FOR EVER. Eccles I, 4. Of the sun moon, and stars, we read :—"They shall fear thee as long as the SUN AND MOON ENDURE, throughout ALL GENERATIONS." Ps. LXXII., 5. "His name shall endure FOR EVER; his name shall be continued as long as the sun,"—ver. 17. "Praise ye him, sun and moon: praise ye him all ye stars of light. Let them praise the name of the LORD; for he commanded, and they were created. He hath established them FOR EVER AND EVER: he hath made a decree which SHALL NOT PASS. " Ps. CXLVIII., 3, 5, 6. These enuciations are certainly all that will be required to manifest the divine intention that the universe shall not cease to exist. A perishing earth is used in the language of correspondences to describe a perishing church in the following and many other passages "The earth is utterly broken down, the earth is *clean dissolved*, the earth is *moved exceedingly*." Isa. XXIV, 19. "The curse *devoured* the *earth* and they that dwell therein are desolate; therefore the *inhabitants of the earth are burned*, and few men left," Isa. XXIV 6. "For my people is foolish and they have not known me; they are sottish children, and they have no understanding; they are wise to do evil, but to do good they have no knowledge, I beheld the *earth*, and, lo, it was *without form and void*, and the heavens, and they had no light." Jer. IV. 22. 23. Here we have the picture of an apostate church in a state of declension from goodness, described by the earth being clean dissolved, as moved exceedingly, as being without form and void, and the inhabitants thereof as being burnt up. It is most evident that neither of these statements can be literally true of the natural earth. It is written in Joel "In those days will I pour out my spirit and I will show wonders in the heavens and in the earth, blood, and fire, and pillars of smoke. The *sun* shall be turned into darkness, and the *moon* into blood, before the great and terrible day of the LORD come," II. 30., 31. The apostle Peter on the day of Pentecost, Acts XI, 16, 21, cites the entire passage from Joel, and refers to it as being fulfilled on that day, but we know as well as we can know any thing, that these great commotions did not actually take place in the kingdom of nature, at that time. Our ever blessed LORD and glorified REDEEMER was seen by the beloved disciple in Apocalyptic vision, as "One like unto the Son of Man, clothed with a garment down to the foot and girt about the paps with a golden girdle. His head and his hairs were white like wool, as white as snow, and his eyes were as a flame of fire, and his feet were like unto fine brass as if they burned in a furnace, and his voice as the sound of many waters. And he had in his right hand seven stars, and *out of his mouth went* a sharp two-edged sword, and his countenance was as the *sun* shining in his strength." Rev. I, 13, 16. One like unto the Son of Man, signifies the Lord as to the Word, clothed with a garment down to the foot signifies the proceeding divine, which is divine truth, for garments in the Word denote truths, and girt about the paps with a golden girdle signifies the proceeding and at the same time the conjoining divine which is divine good; by the paps or breast, divine love is signified, as is evident from those passages in the Word where they are mentioned. as also from their correspondence with love; and his eyes were as a flame of fire, signifies the divine wisdom of the divine love, and his feet like unto fine brass as if they burned in a furnace, signifies divine good natural; fire, or what burns, signifies good; and fine brass signifies the good of truth natural, therefore by the feet of the Son of the Man like unto fine brass, as if they burned in a furnace, is signified divine good natural, and His voice as the sound of many waters, signify divine truth natural; for waters in the Word denote truth: and in his right hand seven stars, signifies all knowledges of good and truth in the church from Him, which are thence with the angels of heaven and men of the church; and out of his mouth went a sharp two-edged sword, signifies the dispersion of falses by the Word and by doctrine thence from the Lord; and his countenance was as the sun shining in his strength, signifies His divine love from which are all things of heaven, for this is the signification of faces when predicated of the Lord as denoting His divine love, from which is all good, thus also all things of heaven. Regarding the blessings promised to him that overcometh, it is written, "And I will give him the morning *star*," Rev. 11.28. signifying that intelligence and wisdom from the divine human principle of the Lord will be imparted to all those who love and obey Him. Literally understood such a gift would be incomprehensible, for how could the morning star of nature be given to any one? "And there appeared a great wonder in heaven; a woman clothed with the *sun*, and the *moon* under her feet, and upon her head a crown of twelve *stars*; and she, being with child, cried, travailing in birth, and pained to be delivered. And there appeared another wonder in heaven; and behold a great red dragon, having seven heads and ten horns, and seven crowns upon his heads, and his tail drew the third part of the stars of heaven and did cast them to the earth; and the dragon stood before the woman which was ready to be delivered, for to devour her child as soon as it was born." Rev. xii, 1. 4. And there appeared a great wonder in heaven, signifies revelation from the Lord concerning the New Church in the heavens and on earth, and concerning the difficult reception and resistance which its doctrines will meet with. A woman clothed with the sun, and the moon under her feet, signifies the Lord's New Church in the heavens, which is the new heaven, and the Lord's New Church about to be upon earth, which is the New Jerusalem, for it has pleased the Lord in His Word to cause His Church to be represented under the similitude of a woman, as well as by the symbol of a city, as witness "Come hither, and I will shew thee the bride, the *Lamb's* wife." Rev. xxi. 9. Where by the Lamb is signified the Lord as to the essential innocence of His Divine Human nature, and by the bride is signified His church, represented by the New Jerusalem about to be conjoined to Him. The reason why she appeared clothed with the sun is, because this church is principled in love to the Lord, for it acknowledges Him, and does His commandments, and this is to love Him. By the moon is signified intelligence in the natural man, and faith, and the reason why the moon was seen under her feet is, because the church on earth is understood, which is not yet conjoined with the church in heaven; by appearing under her feet is further signified that it is about to be upon earth, and will as to doctrine be grounded on the divine truths of the Word; and upon her head a crown of twelve stars, signifies the wisdom and intelligence of this church from knowledges of divine good and divine truth derived from the Word; by the crown on her head is signified wisdom and intelligence, and by stars are signified the knowledges of divine good and truth. And she being with child, cried, travailing in birth, and pained to be delivered, signifies the doctrine of the New Church about to *come forth*, and its difficult reception in consequence of the resistance it meets with from those who are understood by the dragon. To be with *child* signifies the birth of doctrine, because by the child which was in the womb, whose birth is treated of in ver. 5. is signified the doctrine of the New Church, for nothing else is signified by being with child or in travail and bringing, forth, in the spiritual sense of the Word, but to conceive and bring forth those things which relate to spiritual life.

And there appeared another wonder in heaven; signifies revelation from the LORD concerning those who are against the New Church and its doctrine. And behold a great red dragon, signifies those in the Reformed Church who make GOD three, and the LORD two, and separate Charity from Faith, and insist on the latter being competent to salvation without the former. Such are here meant and in what follows, by the dragon: for they are against the two essentials of the New Church, which are, that GOD is one in essence and in person, in whom there is a Trinity, and that the LORD is that GOD; also that charity and faith are a one as an essence and its form; and that none have charity and faith but those who live according to the commandments, which say that evils are not to be done, and in proportion as any one does not commit evils, by shunning them as sins against GOD, in the same proportion he does the goods which relate to charity, and believes the truths which relate to faith; having seven heads, denotes insanity from the profanation and falsification of the truths of the Word; and ten horns, which denotes much power, and seven crowns upon his heads, signifies all the truths of the Word falsified and profaned; and his tail drew the third part of the stars of heaven, and did cast them to the earth, signifies that, by falsifications of the truths of the Word they have alienated all spiritual knowledges of good and truth from the church, and by application to false doctrines have entirely destroyed them: and the dragon stood before the woman who was ready to be delivered, to devour her child as soon as it was born, signifies that they who are meant by the dragon will endeavour to extinguish the doctrine of the New Church at its birth. In the narrative continued in verse 5, by "she brought forth a male child," is denoted the doctrine of the New Church; "who was to rule all nations with a rod of iron, signifies which, by truths from the literal sense of the Word, and at the same time, by rational arguments drawn from the light of nature, will convince all who are in dead worship through being principled in faith separated from charity that are willing to be convinced. "And her child was caught up to God and to his throne," signifies the protection of the doctrine by the LORD because it is for the use of the new church, and its being guarded by the angels of heaven. "And the woman fled into the wilderness." signifies the new church which is the new Jerusalem, at first confined to a few, where there are no longer any truths, for by a wilderness in the Word, is signified, 1. The church devastated, or in which all the truths of the Word are falsified, such as it was among the Jews at the time of the LORD's advent. II. The church in which there were no truths, from not possessing the Word, such as it was among the well-disposed Gentiles in the LORD's time. III. A state of temptation, in which man is, as it were, without truths, because surrounded by evil spirits who induce temptations, and and then. as it were, deprive him of truths. It will be seen from this that a spiritual wilderness is in exact correspondence with a natural wilderness, which signifies a place where there is little or no water, for water denotes truth. Passages from the Word in corroboration of these statements are too numerous to be cited here, but will occur to every attentive reader of its contents. And the city had no need of the SUN, neither of the Moon, to shine in it, for the glory of GOD did lighten it, and the LAMB is the light thereof, Rev. xxi., 23. By the sun is here signified natural love separate from spiritual love, which is self love; and by the moon is signified intelligence and also faith natural, separated from intelligence and faith spiritual. which is self-derived intelligence and faith from self; this love, and this intelligence and faith, are here signified by the sun and moon, which will not be required to shine upon those who will be in the LORD's New Church; by the glory of GOD which lightens it, is signified the divine truth of the Word, and because that light is from the LORD, it is said that the light thereof is the Lamb. "That ye may be the children of your Father who is in heaven; for he maketh his SUN to rise on the evil and the good, and sendeth rain on the just and on the unjust." *Matt. v., 45, signifies in the* spiritual sense that from the LORD, as a sun, proceeds light and heat; the light which proceeds, inasmuch as it is spiritual light, is the divine truth, and the heat inasmuch as it is spiritual heat, is the divine love; these flow from the LORD continually into every man, but are variously received according to the state of the recipient: by the evil they are turned into evil and what is false, by the good they are received as good and truth, and are thus comforted and built up by them. The correspondence is closely seen in the case of the sun of nature, which although it emits nothing but light and heat into external objects, still the effects are very different on a putrid carcass, and the growing fruits of the earth, or a beautiful flower garden. Again, in David, "His seed shall endure for ever, and his throne as the SUN before me. It shall be established for ever as the MOON," Ps. LXXXIX., 36, 37. By David, who is here treated of in the literal sense, is understood the LORD. By his seed which shall endure for ever, is signified the divine truth, and all those who shall receive it. By His throne which shall endure as the sun, is signified heaven and His church, which are principled in celestial good, which is the good of love. By His throne which shall be established as the moon for ever, is signified heaven and the church which are principled in spiritual good, which is the divine truth. Concerning those who love the LORD it is written, "Let them who love Him be as the SUN when he goeth forth in his might," by which is signified the operation of the Lord's divine love in them. Again, in Is. LX., 20, "Thy SUN shall no more go down; neither shall thy MOON withdraw itself; for the LORD shall be thine everlasting light." These words treat of the LORD, and of the new heaven and new earth, that is concerning the church to be established by Him. That the good of love to the Lord should not perish, nor the good of charity towards their neighbour in those who belong to that church, is understood by, "Thy sun shall no more go down, neither shall thy moon withdraw itself;" That they shall continue to eternity in truths from the good of love, is understood by, "The LORD shall be thine everlasting light, and the days of thy mourning shall be ended," everlasting light being predicated of those who are in the good of love to the LORD, and ending of the days of mourning, of those who are in the good of charity towards their neighbour. In an opposite sense, we have, "The SUN shall not smite thee by day nor the MOON by night, The LORD shall preserve thee from all evil; he shall preserve thy soul," Ps. cxxi., 6, 7. By the sun is here understood the love of self, and by the moon the false principle thence derived; inasmuch as all evil is from that love, and from evil what is false, therefore it is said, "The LORD shall preserve thee from all evil; he shall preserve thy soul," the soul here signifying the life of truth. This is the sun meant by our blessed LORD in the parable when he says, "But when the SUN was up it was scorched, and because it had no root it withered away," Mark IV., 6. This is the sun that has ripened and brought forth more direful fruits of evil than all other causes combined, having in short, populated hell with inhabitants, and filled the earth with every phase of woe and misery which it contains; it is the very opposite of that SUN of which it is written; "But unto you that fear my name shall the SUN of Righteousness arise with healing in his wings," Mal. iv., 2. The sun of righteousness here denotes the divine celestial principle, or the Lord as to the good of love; and the wings of the LORD in which there is healing signifies truth from that good, which is the divine spiritual principle; healing denotes reformation thereby From this uncreated and infinitely glorious SUN, as from a boundless ocean, is derived all the blessings of love, wisdom, mercy and happiness enjoyed by all in heaven or on earth; through and by the reception of its influent life every thing exists, without it nothing can exist, either in the visible or the invisible creation, and just so far as our wills and understandings are expanded to receive and appropriate the ineffable delights which it communicates, just so pure, unsullied and seraphic will be our joys and beatitudes both in this world and that which is to come, for in that SACRED PRESENCE there is fulness of joy, and pleasures for evermore.

Note the correspondence of *oil* and *wine* in the parable, where our *LORD said* of the Samaritan, that coming to the man who was wounded *by thieves*, he bound up his wounds, and poured in oil and wine, Luke x. 34 *Where by* oil and wine is not meant these things, but the good of love and charity, by oil the good of love and by wine the good of charity, and of faith, for the subject treated of is concerning the neighbour, thus charity towards him, "Thou preparest a table before me in the presence of mine enemies: Thou anointest my head with oil, my cup runneth over," Ps. XXIII. 5. To prepare a table and anoint the head with oil denotes to be gifted with the good of charity and love; my cup runneth over, denotes that the natural principle will be thence filled with good and truth. Again, "I have found David my servant, with my holy oil have I anointed him " Ps. LXXXIX. 20 where by David is meant the LORD, the oil of holiness with which he was anointed, signifies the Divine good of the Divine love. By the oil or ointment on the head and beard of Aaron, Ps. CXXXIII. is denoted celestial and spiritual good or the good of love to the LORD and the good of charity to the neighbour, for it is compared to the dew of Hermon that descended upon the mountains of Zion; for there the LORD commanded the blessing, even life for evermore. By the dew of Hermon that descended upon the mountains of Zion is signified that holy principle of divine truth proceeding from celestial good which causes unutterable felicity in the mind of the man in whom it reigns, and which is described as that "peace which passeth all understanding." From oil denoting celestial good and spiritual good we may see the reason why it was used in the anointing of the Kings of Israel, also the significance of the anointing oil for the priests, and its use on the vessels and lamps of the tabernacle, as well as in the flour and cakes for the offerings &c. From this also may be understand the meaning of *oil* in the parable of the ten virgins, Matt. XXV. 1. and the command not to hurt the *wine* and the *oil*, Rev. VI. 6, and a hundred other places when it is mentioned in the Word. To descend to lower things, see with what quietness and beauty a line of shafting will run at a high velocity on brass bearings when well lubricated with oil; brass corresponds to natural good and oil to celestial good; try the same experiment on iron bearings, without oil, iron corresponds to natural or sensual truth, which is hard and grating, and witness the consequences! Let us ascend a step higher and witness the delight we experience in holding intercourse with a person of a sincere, kind, considerate and obliging dispostion, for in his every word and look we can behold in his countenance traces of that "oil which maketh the face to shine."

We will find the correspondence of bread and water, and flesh and blood equally instructive. Bread and water are spoken of, when all the goods of love and truths of faith are meant. Truth, in regard to good, is as water in regard to bread, or as drink in regard to meat, in nourishment. Bread signifies the primary principle which nourishes the soul, as it denotes the flesh of the LORD, by which is signified the divine good or love, hence He says "The *bread* of GOD is he that cometh down from heaven, and giveth life unto the world" John VI. 33, and again," I am that *bread* of life" vers. 48, and from this it comes that the bread in the holy supper denotes the LORD, and all the celestial principles of love as proceeding from Him, which is meant when He says, " Whoso eateth my *flesh*, and drinketh my *blood*, hath eternal life ; and I will raise him up at the last day," (ver. 54) and again," He that eateth my *flesh*, and drinketh my *blood*, dwelleth in me and I in him, verse 56. To eat the LORD'S flesh and drink His blood is to receive His divine love in the heart or will, and His divine truth in the understanding, and to live a life according to them, for by this, conjunction is effected, and this is the reason why bread and wine were appointed to be used in the Holy Supper, for by bread is signified the LORD'S divine love, and by wine is denoted His divine truth, eating signifying appropriation and conjunction, hence the LORD'S supper is in very deed the holiest act of worship. The bread of the sacrifices represented the good of love to the LORD, hence it is written "Thou desirest not sacrifice, thou delightest not in burnt offering; the sacrifices of GOD are a broken spirit," Ps. LI. 16, 17, by which is signified an humble heart, which confesses that man's own intelligence is nothing, and that from the LORD alone proceed every thing of goodness and truth that man can receive. By bread in the LORD'S prayer as well as in the holy supper, is signified in the supreme sense, the LORD and the things of celestial love. In an opposite sense, to *eat bread in the* sweat of the face, Gen. III, 19, represents celestial truths

sun, moon, and stars; of the earth with her mountains, valleys and rivers; of men, animals and plants, gold and silver, brass and iron, and a thousand other things which appear in the natural world. In all these descriptions there is a constant reference to the internal and spiritual causes from which these things exist, and to which they correspond. The WORD, in its literal sense, is thus wrought together with infinite skill, constituting a permanent receptacle of divine and spiritual things. Within are the living principles, the *spirit* and *life* of the Word, of which it is said, "The words I speak unto you, they are *spirit* and they are *life*" John vi. 63. The science of correspondences is to the Word of GOD what the mathematical science is to the phenomena of the material universe. It reveals order, harmony, beauty and Divine perfection in the midst of what seemed to be disorder, uncertainty, inextricable confusion and even contradiction. It is a most melancholy spectacle at this day to see professed expounders of the Word tell their hearers that the Bible is full of errors, that such and such passages contradict each other, and then proceed forthwith to communicate a vast amount of erudite self-derived intelligence in the shape of glosses, comments and explanations, with the only effect of causing real confusion where there never was any, whilst a knowledge of this heavenly science, for such indeed it is, would have enabled them to harmonize all apparent discrepancies at once.

Not so were the men of the most Ancient Church described in those Divinely composed allegories in the beginning of Genesis, previous to that awful apostacy and declension from goodness described under the representation of a flood which swept over the whole earth. They were gifted with such an intuitve knowledge from above, that they could, as it were, read God's word in His Works, and learn and think of heavenly things through and by means of the contemplation of corresponding earthly things. For example, when with the natural eye they beheld a mountain, instantly the emotions of their minds would assume a corresponding elevation towards the LORD, for by a mountain in the most Ancient Church was signified the LORD, and all that is celestial from Him, as the good of love and charity; the most ancient people, and all the ancients, even the Gentiles, worshipped on mountains from this origin. Hence it is written, "I will lift up mine eyes to the *mountains* (or hills), from whence cometh my help, my help cometh from the LORD, which made heaven and earth," Ps. cxxi. We may see from this the true reason why the blessed REDEEMER taught the people from mountains, ascended up into high mountains, and abode in mountains to such an extent as is recorded of Him in the gospels. For the sake of farther illustration it may be proper in this place to adduce a harmony of passages where mountains are mentioned, together with the internal sense signified by them. All the high *mountains* covered with the waters of the flood (Gen. vii. 19.) denotes that all the goods of charity were extinguished by falses and persuasions of the false, or what is the same, overflowing wickedness. The ark of Noah resting upon the *mountains* of Ararat, [Gen, viii, 4, 5], denotes the first light after temptation, which is from charity. The children of Shem dwelling from Mesha, as thou goest unto Sephar, a *mount* of the east, (Gen. x. 30.), denotes worship from the truths of faith extending to the good of charity as its end. Abraham's removal unto a *mountain* on the east of Bethel (Gen. xii. 8), denotes the progression of celestial love with which the LORD was imbued in infancy, for by Abraham in the word is represented the LORD as to the divine celestial principle, or divine good. They that remained flying to the *mountains* after Abraham's victory in Siddim (Gen. xiv. 10), denotes the love of self and the world against which the LORD fought from his love for the whole human race. Lot said to ascend from Zoar and dwelling in a cave in the *mountain* (Gen, xix, 30] denotes the obscure good of those who are without the truths of faith. Jacob sacrificing a sacrifice in the *mountain* (Gen. xxxi. 54), denotes worship from the good of love. The angel of the LORD appearing to Moses in the *mount* of GOD (Ex. iii. 2), denotes the divine human manifested in the good of love; ye shall serve God upon this *mountain*, said to Moses (Ex. iii. 12), denotes the perception and acknowledgement of the Divine from love. Moses to stand on the top of the *mount* with the rod of GOD in his hand, during the battle with Amalek, denotes the conjunction of truth divine with the good of charity, and truth in power

good; Israel prevailing when Moses raised his hand and Amalek
illing when he let down his hand, denotes that the victory is with
who are in the truth and good of faith when they look upwards to
ORD; but that the false overcomes them when they look down to self
he world, for Amalek represents interior evil. Israel to be planted
mountain of the LORD's inheritance, (Ex. xv. 17,) denotes regenera-
and heaven, from the life of truth and goodness. The Israelites
nped at the *mount* of GOD (Ex. xviii. 5], denotes the new arrangement
iths when about to be conjoined with good in the second stage of
eration. The LORD came from Sinai, He shone from *mount* Paran
xxxiii. 2), denotes the proceedure of Divine truth or the law, from
e good. The *mountains* filled with horses and chariots of fire round
Elisha (2 Kings vi. 17), denotes doctrinals good and true from the
The *mountains* shall bring peace and the little hills by righteousness
xxii. 3), denotes love to the Lord and the neighbour, such as it was
most ancient church. Upon every lofty *mountain*, and upon every
hill, rivers and streams of water, (Isa. xxx, 25), denotes the goods of
nd charity, and the truths of faith from them, for, rivers and streams
ter signify truths; like one going to the *mountain* of the LORD, to the
ty One of Israel (Isa. xxx. 29), denotes the LORD as to the good of
nd the good of charity. Get thee up into the high *mountain*, lift up
oice with strength (Isa. xl. 9; xlii. 11), denotes the worship of the
from love. He that putteth his trust in me shall possess the land,
all inherit my holy *mountain*, (Isa. lvii. 13), denotes the Lord's King-
where all is love and charity. The glory of the Lord upon the *moun-*
ast of the city (Ezek. xi. 23), denotes the sphere of celestial love from
ORD. The house and the top of the *mountain* made holy (Ezek. xliii.
enotes the Lord's celestial kingdom from the good of love. Judah
a *mountain* in a field, (Jer. xvii. 3), denotes the principle of celestial
n the LORD's Kingdom represented by them. The *mountain* of the
egation in the sides of the north (Isa. xiv. 13), denotes the obscure
where the influx of good, which flows in with light from the LORD,
minated. Four chariots going out from between two *mountains* of
(Zec. vi. 1–8), denotes the precedure of doctrinals from the good of
to the Lord and love to the neighbor in the natural degree. The
tains shall distil sweet wine and the hills shall melt, when captive
is restored (Amos ix. 13), denotes the good of love and charity when
piritual church is delivered from falses. The LORD of hosts came
to fight for *mount* Zion and for the hill thereof (Isa. xxxi. 4) denotes
nnipotence of divine good and divine truth. Contend with the
tains and let the hills hear thy voice (Mic vi. 1), denotes truth speak
ith those who are elate of heart in self-love, and with those who are
rity. And it shall come to pass in the last days that the *mountain*
LORD's house shall be established in the top of the *mountains* and
be exalted above the hills and all the nations shall flow unto it, and
people shall go and say, Come ye, and let us go up to the *mountains* of
ORD and to the house of the GOD of Jacob, and He will teach us His
and we will walk in His paths, (Isa. ii. 2–3). These words are spoken
New Church to be established by the LORD; by the mountain of the
, which shall then be established in the top of the mountains, is under-
Zion; and by Zion, is signified the celestial church, and love to the
which is communicated to those who belong to that church, that this
primary principle of the church, and that it shall increase and gain
th, is signified by its being in the top of the mountains, and exalted
the hills; that they who are principled in the good of love shall
wledge the LORD, and accede to the church, is signified by all nations
g to that mountain, nations signifying those who are in celestial
which is the good of love to the LORD, and people, those who are in
al good, which is the good of charity towards the neighbor. They
south shall possess the *mount* of Esau, (Obad. 19), denotes the good
e with those who are in the light of truth. His feet shall stand in
ay upon the *mount* of Olives, and the *mountain* shall divide, etc.
xiv. 4), denotes the advent of the LORD in the good of love and
y, and the church formed by such goods receding from the Jews to
tions. The LORD set upon a high *mountain* and upon a pinnacle of

the temple, by the devil, denotes the extreme temptation combats that he sustained against the loves of self and the world, thus against hell. Let them which be in Judea flee into the *mountains* (Matt. xxiv. 16), denotes salvation in love to the Lord and charity to the neighbor. They shall say to the *mountains*, Fall on us, and to the hills, cover us (Rev. vi. 16), denotes the state of the evil unable to bear the Lord's presence. A great *mountain* burning with fire cast into the midst of the sea (Rev. viii. 8), denotes the love of self in the scientifics of the natural man. From the examples it may be seen that there is an opposite side from love and goodness, when evil is treated of, for who does not know that there are mountains of pride and self-love of a very different kind from the love of the Lord and the neighbor? Other instances could be noted, but enough has been brought forward satisfy the present purpose.

Mention has been made of those ancestors of the human race who existed in the times of primitive integrity, happiness, purity and goodness. Not without the best of reasons did the ancients speak of that period as the GOLDEN age. In modern times, for a similar reason, we speak of the *golden* rule, a heart of *gold*, *golden* fruit, *golden* opinions, *golden* opportunity, etc., and no one is ever at a loss to perceive the correspondence existing between the symbol and the preciousness of the thing or quality represented by it. The nature and qualities of gold are well known. Its red, bright color, corresponding to that of burning fire, is symbolic of love or goodness, as is also the inherent warmth of the metal. No uncombined acid can corrode or dissolve it, acids corresponds to truth falsified, which in other words is evil or wickedness, so "charity suffers long and is kind." The most intense heat has no further effect on gold than to still further purify it, while its intrinsic value renders it a most proper emblem of that desirable quality which it is used to represent or symbolize in the Word of God, viz., that of the good of love from the Lord. Silver in the internal sense of the word signifies truth, and in an opposite sense, the false. From this correspondence we can understand how the solution of silver used in photography is so sensitive to the rays of light, for natural light corresponds to spiritual light, which is the veriest divine truth, or that True Light which lighteth every man that cometh into the world. The *color* of silver is also in correspondence with the resplendency of light. Regarding gold and silver it may be well to state that in the Word they stand in a sort of mutual relation to each other, representing respectively love and wisdom, charity and faith, goodness and truth, will and understanding; the affections, or the feminine principle, and the intellectual, or the masculine principle. From this correspondence arises the mutual affinity these metals have for each other in the numerous intermixtures and appliances in the various arts and manufactures of the world. Inferior metals, such as brass, iron, etc., are used in the Word to denote a lower degree of goodness and truth. We will now approach the sacred writings to see to what extent these remarks will be confirmed. The river of Eden encompassing the whole land of Havilah, where there is *gold* and precious stones (Gen. ii, 11, 12) denotes the state of the celestial man as to love and faith. Abram's being very rich in *silver* and *gold* (Gen. xiii. 2) denotes the state of the Lord in youth as to celestial good and truth. The Israelites borrowing jewels of *silver* and jewels of *gold* and raiment of the Egyptians (Exodus xii. 35) denotes scientific truths and goods taken away from the evil, and acquired by those who are of the spiritual church. The people offering *gold* and *silver*, and brass, and blue and purple, etc., for the works of the tabernacle, denotes interior things collated and disposed in externals, where they are represented. The *gold* of the ark, and the border of *gold* round about it, denotes good in the inmost, and the common sphere of good which proceeds from the Lord, and contains all. The mercy seat and the cherubim of *gold* denotes the hearing and reception of worship, and approach to the Lord from the good of love. The table of shew bread covered with *gold*, and the border of gold round about it, denotes the reception of all that conduces to the spiritual life in good, and the sphere of good affording protection from evil. The candlestick, its branches, etc., all of *gold* denotes all mental illumination, and intelligence, or the truth of faith proceeding from good. The couplings for the curtains of *gold*, denotes the whole connection and conjunction of truths, thus the whole order and harmony of heaven, preserved by the good of love. The boards of cedar covered with *gold* denotes the whole merit and good of works, thus all the good that sustains heaven, from the good of love, thus from the Lord. The blue, the purple, and scarlet and fine linen of the ephod, embroidered all over with *golden* thread, denotes the universal prevalence of love, and every manifestation of charity and faith imbued therewith. The sockets of the onyx stones made of *gold*, and the chains of *gold*, denotes the subsistence and coherence of all things in the memory grounded in good. All the stones of the breastplate set in *gold*, its rings and chains of *gold*, denote all the goods and truths of the internal man proceeding from the divine good, surrounded by the sphere of good, and their indissoluble conjunction thereby. The bells of *gold* upon the border of the robe of Aaron denote all that is heard and perceived of the church, thus all doctrine and worship to be from good. The plate of *gold* engraved with "Holiness to the Lord" upon Aaron's forehead, denotes illustration and wisdom proceeding from the divine good of the Lord. The altar of incense covered with *gold* denotes the elevation or hearing and reception, of all worship rising from love and charity. Bezaleel, of the tribe of Judah, called and inspired to do these works for the tabernacle, to work in *gold* etc., denotes those who are in the good of love receiving the divine influx, and their exceeding wisdom. In the opposite sense, the ear-rings of *gold* given to Aaron to make the *golden* calf, denote the delight of external loves, which are the loves of self and the world, rendering worship idolatrous, thus the good of the external man instead of the good of love, or divine good, is represented. *Gold* signifies spiritual good, much fine *gold* celestial good. (Psa. XIX. 10.) I counsel thee to buy of me *gold* tried in the fire, that thou mayest be rich, (Rev. III. 18), denotes the good of celestial love derived from the Lord. *Gold* and precious stones (Rev. XVII. 4), denotes divine spiritual good, and divine spiritual truth, both derived from the Word. How is the *gold* become dim, how is the most fine *gold* changed. (Lam. IV. 1), denotes the spiritual and celestial goods of the church lightly esteemed through declension into evil. The precious Sons of Zion comparable to fine *gold*, (Lam. IV. 2), denotes those who are in wisdom from divine truths. *Gold, brass*, and *wood*, (Isa. lx. 17.), represent the three celestial principles, the inmost principle is represented by gold, the inferior by brass, and the lower by wood. The use of the *gold* and *silver* vessels belonging to the temple of Jerusalem at Belshazzar's feast, while they praised the gods of gold, and of silver, of brass, of iron, of wood, and of stone, (Dan. v. 2,3,4), denotes the profanation of the knowledges of good and truth by those who are in falses, his kingdom being divided, signifies the dissipation of goods and truths, and he himself being slain that night, signify the privation of the life of good and truth, consequently, damnation. And the street of the city was pure *gold*, as it were transparent glass. (Rev. XXI. 21.) By the city, or New Jerusalem, is meant the Lord's New Church as to every thing pertaining to it interiorly considered, or within the wall; by gold is signified the good of love from the Lord, and like unto pure glass, signifies pellucid or transparent from divine wisdom, and since the latter appears in heaven as light, and flows from the Lord as a sun, just as natural light flows from the natural sun; by like unto pure glass is signified flowing in together with light from heaven from the Lord. Regarding the Lord's coming it is written, But who may abide the day of His coming? and who shall stand when he appeareth? for He is like a refiner's fire; and he shall sit as a refiner and purifier of silver, and he shall purifiy the sons of Levi, and purge them as *gold* and *silver*, that they may offer unto the Lord an offering in righteousness. Then shall the offering of Judah and Jerusalem be pleasant unto the Lord, as in the days of old, and as in former years (Mal. III. 3, 4). By Levi in a supreme sense is signified love and mercy, in a spiritual sense, charity in act; consequently the sons of Levi signify those who are in the affection of truth and live in the good of life. The name denotes *to adhere*, by which in the Word, is signified conjunction through love, by the refiner's fire is denoted temptation, whereby is effected purification, which is here meant by purifying and purging them as gold and silver. By Judah is signified the Lord's celestial church, or those who love the Lord above all things, and by Jerusalem those who are in neighbourly love, the offering they will bring unto the Lord is faith and charity, by the days of old and former years are meant the ancient churches, and the states of the worship of the Lord at that time. It is obvious that the sons of Levi mentioned in this passage cannot mean those who were officiating as priests during the time of our Redeemer's incarnation, for they were of that outrageously wicked crew who wilfully crucified the Lord of Glory. In the internal sense of the Word the twelve tribes of the children of Israel signify the church as to all its goods and truths; the same is signified by the twelve disciples of the Lord, and by the twelve gates and twelve foundations of the New Jerusalem, as it is stated regarding these last, that names were written thereon, which were respectively, the names of the twelve tribes of Israel and those of the twelve apostles of the Lamb. Jerusalem adorned with *gold* and *silver*, (Ezek. xvi. 13), the temple with its *gold* and *silver* claimed as the Lord's, (Hag. ii. 8) denotes the church gifted with wisdom and intelligence, or celestial and spiritual knowledge. *Gold* and *silver* made into images of men, and whoredom committed with them, (Ezek. xvi. 17), denotes profanation predicated of celestial and spiritual knowledges. The ships of Tarshish to bring *silver* and *gold*, (Isa. lx. 9), denotes knowledges when the Lord's kingdom is established, by which truths and goods are acquired. He who is without *silver* invited to buy and eat, denotes such as are in ignorance of truth, but in the good of charity. *Silver* and *gold* gotten by Tyre (Ezek. xxviii. 4, Joel iii. 5) denote intelligence, or what is the same, truths and wisdom. *Silver* purified seven times (Ps. xii. 6), denotes divine truth. It is hoped that these examples will suffice to elucidate the statements made regarding the symbolic or representative sense of gold, silver, etc., in the Word.

As regards the correspondence of the sun, moon, and stars, it will be seen from what follows that these natural luminaries are also used by the Divine Author of the Word to represent spiritual and heavenly things, and in an opposite sense, things that are evil. The Sun, in the Word when the Lord is spoken of, signifies his divine love, and at the same time His divine wisdom. Forasmuch as the Lord with respect to His divine wisdom, is meant by the sun, therefore the ancients in their holy worship turned their faces to the rising sun, and also their temples, which practice is still continued. The Moon, in the Word signifies the Lord in reference to faith, and thence faith in the Lord. Stars, in a supreme sense, signifies knowledge concerning the Lord, hence stars signify intelligence of a spiritual kind, or the knowledge of good and truth, which is true wisdom. These statements will now be confirmed from the Word. "And He shall be as the light of the morning when the *sun* riseth, even a morning without clouds, as the tender grass springing out of the earth by clear shining after rain" (ii. Sam. xxxiii., 4,). The light of the morning when the sun riseth, signifies the divine truth proceeding from the Lord as a sun, a morning without clouds denotes the purity of that truth, rain signifies its influx, and the tender grass springing out of the earth signifies intelligence, and reformation thence originating, for these are signified by grass, because grass springs out of the earth by virtue of the sun of the world after rain, and intelligence is from the Lord as a sun by the influx of divine truth. Morning is used in the Word to denote every particular coming of the Lord, or when there is faith and love in the church, the *evening* or night denotes a time or state in which these are wanting. "Blessed of the Lord for his land, for the precious things of heaven, for the dew, and for the deep that coucheth beneath, and for the precious fruits brought forth by by the *sun*, and for the precious things put forth by the *moon*" (Deut. xxxiii. 13, 14.]. This particular blessing was pronounced on Joseph, for the reason that by Joseph are understood the spiritual celestial, who are the highest or supreme in the spiritual kingdom. By his land is signified that Kingdom, likewise the church thence derived. By the precious things of heaven, the dew, and the deep that coucheth beneath, are signified things that are spiritual celestial in the internal and external man. By the precious things brought forth by the sun and the precious things put forth by the moon, are signified all things which proceed from the Lord's celestial kingdom, and all which proceed from His spiritual kingdom, consequently all the goods and truths which are thence derived. "Praise ye the Lord, praise ye Him all His hosts. Praise ye him sun and *moon*, praise Him, all ye *stars* of light" [Psa. cxlviii. 2, 3]. Here by praising the LORD is signified to worship Him. By the angels are signified those who are in divine truths from the good of love, for all such are angels. By all His hosts are signified goods and truths in their whole compass. By the sun and moon are signified the good of love, and the truth from that good. By the stars of light are signified the knowledge of truth from good. Inasmuch as man worships the LORD from those things which he receives from the LORD, thus from the goods and truths that are in him, and as it is also by virtue of such things that man is man, it is therefore said to such things namely, to the sun, moon, and stars, by which are signified goods, truths, and knowledges of truths, that they should worship the LORD. It is clear that the command is not addressed to those luminaries which enlighten the natural world, for how can such things offer praise and worship? And GOD made two great lights, the greater light to rule the day, and the lesser light to rule the night, He made the *stars* also [Gen. 1. 16]. The subject treated of in this chapter is the new creation or regeneration of man, that is of those who constituted the Most Ancient church which is here described in the literal sense of the Word by the creation of the heavens and the earth, those who imagine that this description applies to the creation of the natural universe are much deceived, for how could day and night, or light have an existence previous to the creation of the sun, which according to this account did not come into being until the fourth day? Or how could the earth bring forth grass or the herb yield seed, or the fruit tree yield fruit after his kind, before the sun of nature came into being? These and many other objections have been brought forward by infidels and scoffers, against the authenticity of the Word, and by many others who would consider themselves sorely aggrieved by having these terms applied to them, many who are indeed earnest seekers after truth. Let all such know that the Word of GOD as revealed to us, and the works of GOD as made known to us through those faculties with which He has endowed us, are never in conflict and never contradict each other, but are always in heavenly correspondence and celestial harmony one with the other. GOD'S love in the will, and His truth in the understanding, are here called two great lights, and afterwards love is called a greater light, and faith a less, and it is said of love that it shall *rule by day*, and of faith that it shall *rule by night*. The Most Ancient church acknowledged no faith but love itself; and the universal heaven is of love, no other life being existent in heaven but the life of love. From love is derived all heavenly happiness, which is so great that no degree of it admits of description, or can ever be conceived by any human idea. Those who are under the influence of love, love the LORD from the heart, but yet know, declare, and perceive, that all love, and consequently all life which is of love alone, and thereby all happiness, come only from the LORD and that they have not the least of love, of life, or of happiness, from themselves. The profundity of the Word is such that as to its inmost sense it does not treat in the least of natural things, but only makes use of them to represent and symbolize things that are spiritual, as may be seen from the following in reference to a consummated church, as the end of the age, or "the end of the world" as it is erroneously translated in the authorized version. It is written, "Immediately after the tribulation of those days shall the *sun* be darkened, and the *moon* shall not give her light, and the *stars* shall fall from heaven, and the powers of the heavens shall be shaken; and there shall appear the sign of the Son of Man in heaven; and then shall all the tribes of the earth mourn, and they shall see the Son of Man coming in the clouds of heaven with power and great glory. And he shall send his angels with a great sound of a trumpet, and they shall gather together his elect from the four winds, from one end of heaven to the other". (Matt. xxiv. 29-31). By all these expressions are meant spiritual things relating to the Church, of whose final state or period they are spoken, for in the spiritual sense, by the sun which shall be darkened, is meant love to the LORD; by the moon which shall not give her light, is meant faith towards Him, by the stars which shall fall from the heavens is meant the knowledge of goodness and truth. Every intelligent person will know that it is no more possible for the stars in the firmament to fall to the earth, than it would be for a million of worlds to fall on a pebble by the sea shore. By

A TABLE OF DAILY SAVINGS AT COMPOUND INTEREST.

Cents per Day	*Per Year*	*In Ten Years*	*Fifty Year*
2¾	$ 10	$ 130	$ 2,900
5¼	20	260	5,800
11	40	520	11,600
27½	100	1,300	29,000
55	200	2,600	58,000
1.10	400	5,200	116,000
1.37	500	6,500	145,000

By the above table it appears that if a mechanic, or clerk saves 2¾ per day from the time he is 21 till he is 70, the total with interest will amount to $2,900, and a daily saving of 27½ cents reaches the important sum of $29,000. Save all you can in a prudent manner for a time of possible want, but act justly by paying your debts, and liberally by assisting those in need, and helping in a good cause.

On Profane Swearing—Let every man do his best to discountenance this abominable habit, and shun it as an accursed sin in every possible way. No respectable person will allow himself to be guilty of it. Business men who make a practice of it will find themselves avoided by the best class of customers, for I know that some persons can suffer no mental punishment equal to that inflicted by being compelled to listen to profane language. Besides, every man known as a profane swearer, will not be credited by those whose good opinion is worth having, even when he may be speaking the truth.

Act Well Your Part, Don't be Selfish.—Remember that it is by imparting happiness to others, and making ourselves useful, that we receive happiness. Stand by this truth, live it out, and always keep doing something useful for the common good, doing it well, and acting sincerely. Endeavour to keep your heart in the attitude of cherishing good will to all, thinking and speaking evil of no one, and always with a kind word for everybody. Selfishness is its own curse; it is a starving vice. The man who does no good gets none. He is like the heath in the desert, neither yielding fruit nor seeing when good cometh, a stunted dwarfish, miserable shrub. Let all your influence be exerted for the purpose of doing all you can for the common good, and individual welfare of every one.

Marriage Maxims.—A good wife is the greatest earthly blessing. A wife never makes a greater mistake than when she endeavours to coerce her husband with other weapons than those of love and affection. Those weapons are a sure pull if he has any thing human left in him. Forbear mutual upbraidings. In writing letters, during temporary separation, let nothing contrary to love and sincere affection be expressed, such letters from a wife have a most powerful emotional effect, sometimes little understood by those who write them. It is the mother who moulds the character and destiny of the child as to the exteriors, therefore let calmness, peace, affection, and firmness rule her conduct towards her children. Children are great imitators, whether they have scolding or peaceful mothers, they are generally sure to learn from the examples set before them, and thus the consequent joy or sorrow is trans-

od to other families, therefore let mothers take heed to their luct. It is not possible to exercise judgment and prudence too h before entering on the married life. Be sure that the affec- s on both sides are so perfectly intertwined around each other, the two as it were, form one mind, this requires time; and a ough mutual knowledge on both sides. Marry in your own re- on, and into a different blood and temperament from your own. d your whole powers to avoid depreciatory remarks, jibing and er in every form, and specially avoid everlastingly dishing up unsuccessful past action that was done from a good motive and ı the best intentions at the time. Let nothing foreign to the it of love and mutual affection intervene to cause distance veen husband and wife; to this end let self-denial rule over ı, and reciprocal unselfishness. Avoid habitual fault-finding, ding, &c., as you would perdition itself; many men tremble as cross their threshold into the presence of scolding wives. Let band and wife cultivate habits of sobriety, and specially avoid ıkenness in every form. What a dreadful spectacle it is to see a band transformed into a demon, tottering homeward to a broken- ted wife, whose noble self-sacrificing devotion to him seems artake more of the nature of heaven than of earth. Never part for a journey, without kind and endearing words, and as a symbolizes union from interior affection, do not spare it on ı occasions, repeating it when you return. In one word, let rule supreme.

HILDREN AND HOME CONVERSATION.—Children hunger perpetu- for new ideas. They will learn with pleasure from the lips of nts what they deem drudgery to learn from books, and even if have the misfortune to be deprived of many educational ad- tages they will grow up intelligent if they enjoy in childhood privilege of listening to the conversation of intelligent people. them have many opportunities of learning in this way. Be l to them, and don't think it beneath you to answer their little tions, for they proceed from an implanted faculty which every man and woman should take a great delight in gratifying.

OME AFTER BUSINESS HOURS.—Happy is the man who can find solace and that poetry at home. Warm greetings from loving ts, fond glances from bright eyes, and welcome shouts of ry hearted children, the many thousand little arrangements for fort and enjoyment, that silently tell of thoughtful and expec- love, these are the ministrations that reconcile us to the prose ife. Think of this ye wives and daughters of business men! ık of the toils, the anxieties, the mortification and wear that ers undergo to secure for you comfortable homes, and pensate them for their toils by making them happy by their fire side.

ELL WORTHY OF IMITATION.—A worthy Quaker thus wrote:— xpect to pass through this world but once. If therefore, there ny kindness I can do to any fellow being, let me do it now, ne not defer nor neglect it, for I will not pass this way again." e all to act thus how many would be made happy!

NOTHER SENSIBLE QUAKER.—A Quaker lately propounded the nentous question to a fair Quakeress, as follows; "Hum! yea

and verily; Penelope, the spirit urgeth and moveth me wonderfully to beseech thee to cleave unto me, flesh of my flesh, and bone of my bone." "Hum! truly, Obadiah, thou hast wisely said. Inasmuch as it is not good for man to be alone, lo, I will sojourn with thee."

TABLE CONVERSATION.—Instead of swallowing your food in sullen silence, or brooding over your business, or severely talking about others, let the conversation at the table be genial, kind, social and cheering. Don't bring any disagreeable subjects to the table in your conversation, any more than you would in your dishes. Avoid scandalizing people, and never cherish a jubilant feeling over the infirmities or misfortunes of others. The more good company you have at your table the better. Hence the intelligence, refinement and appropriate behaviour of a family given to hospitality. Never feel that intelligent visitors can be anything but a blessing to you and yours.

KEEP THE HOUSE CLEAN AND WELL VENTILATED.—A neat, clean, fresh aired, sweet, cheerful, well arranged house, exerts a moral influence over its inmates, and makes the members of a family peaceable and considerate of each other's feelings; on the contrary, a filthy, squalid, noxious dwelling, contributes to make its inhabitants selfish, sensual, and regardless of the feelings of others. Never sleep in a small close bedroom, either during summer or winter without free ventilation from door or windows, unless otherwise supplied with abundance of fresh air. It will be seen that a person's house usually corresponds to his character.

SAFE BUSINESS RULES.—BUSINESS MEN, in business hours, attend ONLY to business matters. SOCIAL CALLS ARE best adapted to the SOCIAL CIRCLE. Make your business known IN FEW WORDS, without loss of time. Let your dealings with a stranger be MOST CAREFULLY considered, and TRIED FRIENDSHIP duly appreciated. A MEAN ACT will soon recoil, and a MAN OF HONOUR WILL BE ESTEEMED. Leave "TRICKS OF TRADE" to those whose education was never completed. Treat ALL with respect, CONFIDE IN FEW, WRONG NO MAN. Be never afraid to say No, and ALWAYS PROMPT to acknowledge and rectify a wrong. Leave nothing for to-morrow that SHOULD be done to-day. Because a friend is polite, do not think his TIME is valueless. Have a PLACE for every thing, and EVERY thing in its place. To preserve LONG friendship, keep A SHORT CREDIT, the way to GET CREDIT is to be punctual; the way to PRESERVE IT is NOT TO USE it much. SETTLE OFTEN; have SHORT accounts. Trust no man's APPEARANCES, they are often deceptive, and assumed for the purpose of obtaining credit. Rogues generally dress well. The rich are generally PLAIN MEN. Be WELL SATISFIED before you give a credit, that those TO WHOM YOU GIVE IT are SAFE MEN to be trusted.

APPENDIX TO "THE ARTIZAN'S GUIDE."

ON CORRESPONDENCES.

By reference to page 265 it will be seen that something was stated regarding correspondences, together with an allusion to the appendix for farther information. The amplitude of the subject being very great, no more can be promised here than a very abridged statement by way of illustration. Not being aware that the subject has ever been alluded to in connection with a work of this kind, perhaps some will be inclined to attach a certain amount of blame on account of introducing it here, as there is *apparently* but very slight relationship between the subjects treated of throughout this work and the topic under consideration. But inasmuch as it is believed that its consideration will fulfil a much needed use and command the approbation of all good men, the censure of others is but little regarded in comparison Furthermore, the discrepancy is only apparent, for many things mentioned in this book, together with thousands of other things, will be comprehended just in proportion as correspondences are understood; consequently any effort that tends to dissipate the obscurity, and enlighten the darkness, with which, as regards this subject, many minds are beclouded, must be productive of good, while the knowledge in question will enable us to account for many of the phenomena of the visible creation, such as chemical affinities, the constitution and qualities of different kinds of metal, and their action on each other, besides suggesting innumerable instructive thoughts on other interesting questions of a purely natural kind: nevertheless the writer desires to state that his motive for considering the subject in this place, is a desire to give a few examples of the working of the principle as an unerring rule in unfolding the true meaning of the Sacred writings, for, strange as the assertion may appear to many, the meaning of the Divine Word as to its true or internal sense, can be evolved in no other way. It should be known that the WORD being Divine, is composed in a manner different from all other writings whatsoever, being written by pure correspondences, for which reason, through the use of emblems, symbols, types, and representatives, it contains and embraces within its bosom things which regard the Lord, his heaven, the Church, man, and the things of love and faith, even when such subjects do not in the least appear in the letter while it is being read, for it is a Divine truth, that there are indefinite things in each expression of the *Word*, which appears to man so simple and rude; yea, there is contained therein more than man can ever comprehend, because it is the embodiment of Infinite wisdom, and is as to its inmosts, the Lord Himself. John i -1., Rev. xix, 18 Treat with the utmost reverence therefore, I pray you, whatever has relation to the Word of GOD, for by so doing you do honour to that SACRED NAME which should never be taken in vain. Of all the abounding iniquities of society, none are more destructive of the germs of goodness implanted by our Heavenly Father in man's heart, and none ministers less gratification to the depraved cravings of fallen man, than the profanation of the NAME and WORD of the everblessed GOD. Let every one discountenance this appalling enormity. and beware of it is as he would shun eternal ruin, not only on account of its infamous character as a sin against GOD, but also out of common regard for the feelings of our neighbours.

The science of correspondences unfolds those spiritual laws in accordance with which the word of God is written. The word *correspondence* is derived from the Latin terms *con* and *respondee*, and means, radically, to answer with or to agree. It will serve our purpose here to define it as the appearance of the internal in the external, and its representation there; in other words, internal and spiritual things are mirrored forth and represented in external and natural forms. The WORD throughout, is written with a constant reference to an exact and immutable relation between spiritual and natural things. Various descriptions are there given of the

sun, moon, and stars; of the earth with her mountains, valleys and rivers; of men, animals and plants, gold and silver, brass and iron, and a thousand other things which appear in the natural world. In all these descriptions there is a constant reference to the internal and spiritual causes from which these things exist, and to which they correspond. The WORD, in its literal sense, is thus wrought together with infinite skill, constituting a permanent receptacle of divine and spiritual things. Within are the living principles, the *spirit* and *life* of the Word, of which it is said, "The words I speak unto you, they are *spirit* and they are *life*" John vi. 63. The science of correspondences is to the Word of GOD what the mathematical science is to the phenomena of the material universe. It reveals order, harmony, beauty and Divine perfection in the midst of what seemed to be disorder, uncertainty, inextricable confusion and even contradiction. It is a most melancholy spectacle at this day to see professed expounders of the Word tell their hearers that the Bible is full of errors, that such and such passages contradict each other, and then proceed forthwith to communicate a vast amount of erudite self-derived intelligence in the shape of glosses, comments and explanations, with the only effect of causing real confusion where there never was any, whilst a knowledge of this heavenly science, for such indeed it is, would have enabled them to harmonize all apparent discrepancies at once.

Not so were the men of the most Ancient Church described in those Divinely composed allegories in the beginning of Genesis, previous to that awful apostacy and declension from goodness described under the representation of a flood which swept over the whole earth. They were gifted with such an intuitve knowledge from above, that they could, as it were, read God's word in His WORKS, and learn and think of heavenly things through and by means of the contemplation of corresponding earthly things. For example, when with the natural eye they beheld a mountain, instantly the emotions of their minds would assume a corresponding elevation towards the LORD, for by a mountain in the most Ancient Church was signified the LORD, and all that is celestial from Him, as the good of love and charity; the most ancient people, and all the ancients, even the Gentiles, worshipped on mountains from this origin. Hence it is written, "I will lift up mine eyes to the *mountains* (or hills), from whence cometh my help, my help cometh from the LORD, which made heaven and earth," Ps. cxxi. We may see from this the true reason why the blessed REDEEMER taught the people from mountains, ascended up into high mountains, and abode in mountains to such an extent as is recorded of Him in the gospels. For the sake of farther illustration it may be proper in this place to adduce a harmony of passages where mountains are mentioned, together with the internal sense signified by them. All the high *mountains* covered with the waters of the flood (Gen. vii. 19.) denotes that all the goods of charity were extinguished by falses and persuasions of the false, or what is the same, overflowing wickedness. The ark of Noah resting upon the *mountains* of Ararat, [Gen, viii, 4, 5], denotes the first light after temptation, which is from charity. The children of Shem dwelling from Mesha, as thou goest unto Sephar, a *mount* of the east, (Gen. x. 30.), denotes worship from the truths of faith extending to the good of charity as its end. Abraham's removal unto a *mountain* on the east of Bethel (Gen. xii. 8), denotes the progression of celestial love with which the LORD was imbued in infancy, for by Abraham in the word is represented the LORD as to the divine celestial principle, or divine good. They that remained flying to the *mountains* after Abraham's victory in Siddim (Gen. xiv. 10), denotes the love of self and the world against which the LORD fought from his love for the whole human race. Lot said to ascend from Zoar and dwelling in a cave in the *mountain* (Gen, xix, 30] denotes the obscure good of those who are without the truths of faith. Jacob sacrificing a sacrifice in the *mountain* (Gen. xxxi. 54), denotes worship from the good of love. The angel of the LORD appearing to Moses in the *mount* of GOD (Ex. iii. 2), denotes the divine human manifested in the good of love; ye shall serve God upon this *mountain*, said to Moses (Ex. iii. 12), denotes the perception and acknowledgement of the Divine from love. Moses to stand on the top of the *mount* with the rod of GOD in his hand, during the battle with Amalek, denotes the conjunction of truth divine with the good of charity, and truth in power

from good; Israel prevailing when Moses raised his hand and Amalek prevailing when he let down his hand, denotes that the victory is with those who are in the truth and good of faith when they look upwards to the LORD; but that the false overcomes them when they look down to self and the world, for Amalek represents interior evil. Israel to be planted in the *mountain* of the LORD's inheritance, (Ex. xv. 17,) denotes regeneration, and heaven, from the life of truth and goodness. The Israelites encamped at the *mount* of GOD (Ex. xviii. 5], denotes the new arrangement of truths when about to be conjoined with good in the second stage of regeneration. The LORD came from Sinai, He shone from *mount* Paran (Deut. xxxiii. 2), denotes the proceedure of Divine truth or the law, from Divine good. The *mountains* filled with horses and chariots of fire round about Elisha (2 Kings vi. 17), denotes doctrinals good and true from the Lord. The *mountains* shall bring peace and the little hills by righteousness (Ps. lxxii. 3), denotes love to the Lord and the neighbour, such as it was in the most ancient church. Upon every lofty *mountain*, and upon every high hill, rivers and streams of water, (Isa. xxx, 25), denotes the goods of love and charity, and the truths of faith from them, for, rivers and streams of water signify truths; like one going to the *mountain* of the LORD, to the Mighty One of Israel (Isa. xxx. 29), denotes the LORD as to the good of love and the good of charity. Get thee up into the high *mountain*, lift up thy voice with strength (Isa. xl. 9; xlii. 11), denotes the worship of the Lord from love. He that putteth his trust in me shall possess the land, and shall inherit my holy *mountain*, (Isa. lvii. 13), denotes the Lord's Kingdom where all is love and charity. The glory of the Lord upon the *mountain* east of the city (Ezek. xi. 23), denotes the sphere of celestial love from the LORD. The house and the top of the *mountain* made holy (Ezek. xliii. 12), denotes the Lord's celestial kingdom from the good of love. Judah called a *mountain* in a field, (Jer. xvii. 3), denotes the principle of celestial love in the LORD's Kingdom represented by them. The *mountain* of the congregation in the sides of the north (Isa. xiv. 13), denotes the obscure state where the influx of good, which flows in with light from the LORD, is terminated. Four chariots going out from between two *mountains* of brass (Zec. vi. 1–8), denotes the precedure of doctrinals from the good of love to the Lord and love to the neighbor in the natural degree. The *mountains* shall distil sweet wine and the hills shall melt, when captive Israel is restored (Amos ix. 13), denotes the good of love and charity when the spiritual church is delivered from falses. The LORD of hosts came down to fight for *mount* Zion and for the hill thereof (Isa. xxxi. 4) denotes the omnipotence of divine good and divine truth. Contend with the *mountains* and let the hills hear thy voice (Mic vi. 1), denotes truth speaking with those who are elate of heart in self-love, and with those who are in charity. And it shall come to pass in the last days that the *mountain* of the LORD's house shall be established in the top of the *mountains* and shall be exalted above the hills and all the nations shall flow unto it, and many people shall go and say, Come ye, and let us go up to the *mountains* of the LORD and to the house of the GOD of Jacob, and He will teach us His ways, and we will walk in His paths, (Isa. ii. 2–3). These words are spoken of the New Church to be established by the LORD; by the mountain of the LORD, which shall then be established in the top of the mountains, is understood Zion; and by Zion, is signified the celestial church, and love to the LORD which is communicated to those who belong to that church, that this is the primary principle of the church, and that it shall increase and gain strength, is signified by its being in the top of the mountains, and exalted above the hills; that they who are principled in the good of love shall acknowledge the LORD, and accede to the church, is signified by all nations flowing to that mountain, nations signifying those who are in celestial good, which is the good of love to the LORD, and people, those who are in spiritual good, which is the good of charity towards the neighbor. They of the south shall possess the *mount* of Esau, (Obad. 19), denotes the good of love with those who are in the light of truth. His feet shall stand in that day upon the *mount* of Olives, and the *mountain* shall divide, etc. (Zec. xiv. 4), denotes the advent of the LORD in the good of love and charity, and the church formed by such goods receding from the Jews to the nations. The LORD set upon a high *mountain* and upon a pinnacle of

the temple, by the devil, denotes the extreme temptation combats that he sustained against the loves of self and the world, thus against hell. Let them which be in Judea flee into the *mountains* (Matt. xxiv. 16), denotes salvation in love to the LORD and charity to the neighbor. They shall say to the *mountains*, Fall on us, and to the hills, cover us (Rev. vi. 16), denotes the state of the evil unable to bear the LORD's presence. A great *mountain* burning with fire cast into the midst of the sea (Rev. viii. 8), denotes the love of self in the scientifics of the natural man. From the examples it may be seen that there is an opposite side from love and goodness, when evil is treated of, for who does not know that there are mountains of pride and self-love of a very different kind from the love of the LORD and the neighbor? Other instances could be noted, but enough has been brought forward satisfy the present purpose.

Mention has been made of those ancestors of the human race who existed in the times of primitive integrity, happiness, purity and goodness. Not without the best of reasons did the ancients speak of that period as the GOLDEN age. In modern times, for a similar reason, we speak of the *golden* rule, a heart of *gold*, *golden* fruit, *golden* opinions, *golden* opportunity, etc., and no one is ever at a loss to perceive the correspondence existing between the symbol and the preciousness of the thing or quality represented by it. The nature and qualities of gold are well known. Its red, bright color, corresponding to that of burning fire, is symbolic of love or goodness, as is also the inherent warmth of the metal. No uncombined acid can corrode or dissolve it, acids corresponds to truth falsified, which in other words is evil or wickedness, so "charity suffers long and is kind." The most intense heat has no further effect on gold than to still further purify it, while its intrinsic value renders it a most proper emblem of that desirable quality which it is used to represent or symbolize in the WORD of GOD, viz., that of the good of love from the LORD. Silver in the internal sense of the word signifies truth, and in an opposite sense, the false. From this correspondence we can understand how the solution of silver used in photography is so sensitive to the rays of light, for natural light corresponds to spiritual light, which is the veriest divine truth, or that True Light which lighteth every man that cometh into the world. The *color* of silver is also in correspondence with the resplendency of light. Regarding gold and silver it may be well to state that in the Word they stand in a sort of mutual relation to each other, representing respectively love and wisdom, charity and faith, goodness and truth, will and understanding; the affections, or the feminine principle, and the intellectual, or the masculine principle. From this correspondence arises the mutual affinity these metals have for each other in the numerous intermixtures and appliances in the various arts and manufactures of the world. Inferior metals, such as brass, iron, etc., are used in the WORD to denote a lower degree of goodness and truth. We will now approach the sacred writings to see to what extent these remarks will be confirmed. The river of Eden encompassing the whole land of Havilah, where there is *gold* and precious stones (Gen. ii, 11, 12) denotes the state of the celestial man as to love and faith. Abram's being very rich in *silver* and *gold* (Gen. XIII. 2) denotes the state of the LORD in youth as to celestial good and truth. The Israelites borrowing jewels of *silver* and jewels of *gold* and raiment of the Egyptians (Exodus XII. 35) denotes scientific truths and goods taken away from the evil, and acquired by those who are of the spiritual church. The people offering *gold* and *silver*, and brass, and blue and purple, etc., for the works of the tabernacle, denotes interior things collated and disposed in externals, where they are represented. The *gold* of the ark, and the border of *gold* round about it, denotes good in the inmost, and the common sphere of good which proceeds from the LORD, and contains all. The mercy seat and the cherubim of *gold* denotes the hearing and reception of worship, and approach to the LORD from the good of love. The table of shew bread covered with *gold*, and the border of gold round about it, denotes the reception of all that conduces to the spiritual life in good, and the sphere of good affording protection from evil. The candlestick, its branches, etc., all of *gold* denotes all mental illumination, and intelligence, or the truth of faith proceeding from good. The couplings for the curtains of *gold*, denotes the whole connection and conjunction of truths, thus the whole order and harmony of heaven, preserved by the good of love. The boards of cedar covered with *gold* denotes the whole merit and good of works, thus all the good that sustains heaven, from the good of love, thus from the LORD. The blue, the purple, and scarlet and fine linen of the ephod, embroidered all over with *golden* thread, denotes the universal prevalence of love, and every manifestation of charity and faith imbued therewith. The sockets of the onyx stones made of *gold*, and the chains of *gold*, denotes the subsistence and coherence of all things in the memory grounded in good. All the stones of the breastplate set in *gold*, its rings and chains of *gold*, denote all the goods and truths of the internal man proceeding from the divine good, surrounded by the sphere of good, and their indissoluble conjunction thereby. The bells of *gold* upon the border of the robe of Aaron denote all that is heard and perceived of the church, thus all doctrine and worship to be from good. The plate of *gold* engraved with "Holiness to the LORD" upon Aaron's forehead, denotes illustration and wisdom proceeding from the divine good of the LORD. The altar of incense covered with *gold* denotes the elevation or hearing and reception, of all worship rising from love and charity. Bezaleel, of the tribe of Judah, called and inspired to do these works for the tabernacle, to work in *gold* etc., denotes those who are in the good of love receiving the divine influx, and their exceeding wisdom. In the opposite sense, the ear-rings of *gold* given to Aaron to make the *golden* calf, denote the delight of external loves, which are the loves of self and the world, rendering worship idolatrous, thus the good of the external man instead of the good of love, or divine good, is represented. *Gold* signifies spiritual good, much fine *gold* celestial good. (Psa. XIX. 10.) I counsel thee to buy of me *gold* tried in the fire, that thou mayest be rich, (Rev. III. 18), denotes the good of celestial love derived from the LORD. *Gold* and precious stones (Rev. XVII. 4), denotes divine spiritual good, and divine spiritual truth, both derived from the Word. How is the *gold* become dim, how is the most fine *gold* changed. (Lam. IV. 1), denotes the spiritual and celestial goods of the church lightly esteemed through declension into evil. The precious Sons of Zion comparable to fine *gold*, (Lam. IV. 2), denotes those who are in wisdom from divine truths. *Gold, brass*, and *wood*, (Isa. lx. 17.), represent the three celestial principles, the inmost principle is represented by gold, the inferior by brass, and the lower by wood. The use of the *gold* and *silver* vessels belonging to the temple of Jerusalem at Belshazzar's feast, while they praised the gods of gold, and of silver, of brass, of iron, of wood, and of stone, (Dan. v. 2,3,4), denotes the profanation of the knowledges of good and truth by those who are in falses, his kingdom being divided, signifies the dissipation of goods and truths, and he himself being slain that night, signify the privation of the life of good and truth, consequently, damnation. And the street of the city was pure *gold*, as it were transparent glass. (Rev. XXI. 21.) By the city, or New Jerusalem, is meant the LORD's New Church as to every thing pertaining to it interiorly considered, or within the wall; by gold is signified the good of love from the LORD, and like unto pure glass, signifies pellucid or transparent from divine wisdom, and since the latter appears in heaven as light, and flows from the LORD as a sun, just as natural light flows from the natural sun; by like unto pure glass is signified flowing in together with light from heaven from the LORD. Regarding the LORD's coming it is written, But who may abide the day of His coming? and who shall stand when he appeareth? for He is like a refiner's fire; and he shall sit as a refiner and purifier of silver, and he shall purifiy the sons of Levi, and purge them as *gold* and *silver*, that they may offer unto the LORD an offering in righteousness. Then shall the offering of Judah and Jerusalem be pleasant unto the Lord, as in the days of old, and as in former years (Mal. III. 3, 4). By Levi in a supreme sense is signified love and mercy, in a spiritual sense, charity in act; consequently the sons of Levi signify those who are in the affection of truth and live in the good of life. The name denotes *to adhere*, by which in the Word, is signified conjunction through love, by the refiner's fire is denoted temptation, whereby is effected purification, which is here meant by purifying and purging them as gold and silver. By Judah is signified the Lord's celestial church, or those who love the Lord above all things, and by Jerusalem those who are in neighhourly love, the offering they will bring unto the LORD is faith and charity, by the days of old and former years are meant the ancient churches, and the states of the worship of the LORD at that time. It is obvious that the sons of Levi mentioned in this passage cannot mean those who were officiating as priests during the time of our REDEEMER'S incarnation, for they were of that outrageously wicked crew who wilfully crucified the LORD of Glory. In the internal sense of the Word the twelve tribes of the children of Israel signify the church as to all its goods and truths; the same is signified by the twelve disciples of the Lord, and by the twelve gates and twelve foundations of the New Jerusalem, as it is stated regarding these last, that names were written thereon, which were respectively, the names of the twelve tribes of Israel and those of the twelve apostles of the Lamb. Jerusalem adorned with *gold* and *silver*, (Ezek. XVI. 13), the temple with its *gold* and *silver* claimed as the LORD'S, (Hag. II. 8) denotes the church gifted with wisdom and intelligence, or celestial and spiritual knowledge. *Gold* and *silver* made into images of men, and whoredom committed with them, (Ezek. XVI. 17), denotes profanation predicated of celestial and spiritual knowledges. The ships of Tarshish to bring *silver* and *gold*, (Isa. LX. 9), denotes knowledges when the LORD'S kingdom is established, by which truths and goods are acquired. He who is without *silver* invited to buy and eat, denotes such as are in ignorance of truth, but in the good of charity. *Silver* and *gold* gotten by Tyre (Ezek. XXVIII. 4, Joel III. 5) denote intelligence, or what is the same, truths and wisdom. *Silver* purified seven times (Ps. XII. 6), denotes divine truth. It is hoped that these examples will suffice to elucidate the statements made regarding the symbolic or representative sense of gold, silver, etc., in the Word.

As regards the correspondence of the sun, moon, and stars, it will be seen from what follows that these natural luminaries are also used by the Divine AUTHOR of the Word to represent spiritual and heavenly things, and in an opposite sense, things that are evil. The SUN, in the Word when the LORD is spoken of, signifies his divine love, and at the same time His divine wisdom. Forasmuch as the LORD with respect to His divine wisdom, is meant by the sun, therefore the ancients in their holy worship turned their faces to the rising sun, and also their temples, which practice is still continued. The MOON, in the Word signifies the LORD in reference to faith, and thence faith in the LORD. Stars, in a supreme sense, signifies knowledge concerning the LORD, hence stars signify intelligence of a spiritual kind, or the knowledge of good and truth, which is true wisdom. These statements will now be confirmed from the Word. "And He shall be as the light of the morning when the *sun* riseth, even a morning without clouds, as the tender grass springing out of the earth by clear shining after rain" (II. Sam. xxxiii., 4,). The light of the morning when the sun riseth, signifies the divine truth proceeding from the LORD as a SUN, a morning without clouds denotes the purity of that truth, rain signifies its influx, and the tender grass springing out of the earth signifies intelligence, and reformation thence originating, for these are signified by grass, because grass springs out of the earth by virtue of the sun of the world after rain, and intelligence is from the LORD as a SUN by the influx of divine truth. MORNING is used in the Word to denote every particular coming of the LORD, or when there is faith and love in the church, the *evening* or night denotes a time or state in which these are wanting. "Blessed of the LORD for his land, for the precious things of heaven, for the dew, and for the deep that coucheth beneath, and for the precious fruits brought forth by by the *sun*, and for the precious things put forth by the *moon*" (Deut. xxxiii. 13, 14.]. This particular blessing was pronounced on Joseph, for the reason that by Joseph are understood the spiritual celestial, who are the highest or supreme in the spiritual kingdom. By his land is signified that Kingdom, likewise the church thence derived. By the precious things of heaven, the dew, and the deep that coucheth beneath, are signified things that are spiritual celestial in the internal and external man. By the precious things brought forth by the sun and the precious things put forth by the moon, are signified all things which proceed from the LORD'S celestial kingdom, and all which proceed from His spiritual kingdom, consequently all the goods and truths which are thence derived. "Praise ye the LORD, praise ye Him all His hosts. Praise ye him sun and

, praise Him, all ye *stars* of light" [Psa. cxlviii. 2, 3]. Here by
ing the LORD is signified to worship Him. By the angels are signified
who are in divine truths from the good of love, for all such are
ls. By all His hosts are signified goods and truths in their whole
pass. By the sun and moon are signified the good of love, and the
from that good. By the stars of light are signified the knowledge of
from good. Inasmuch as man worships the LORD from those things
h he receives from the LORD, thus from the goods and truths that
n him, and as it is also by virtue of such things that man is man, it is
fore said to such things namely, to the sun, moon, and stars, by
h are signified goods, truths, and knowledges of truths, that they
ld worship the LORD. It is clear that the command is not addressed
ose luminaries which enlighten the natural world, for how can such
gs offer praise and worship? And GOD made two great lights, the
er light to rule the day, and the lesser light to rule the night, He
the *stars* also [Gen. 1. 16]. The subject treated of in this chapter is
ew creation or regeneration of man, that is of those who constituted
Most Ancient church which is here described in the literal sense of the
d by the creation of the heavens and the earth, those who imagine that
description applies to the creation of the natural universe are much
ived, for how could day and night, or light have an existence previous
e creation of the sun, which according to this account did not come
being until the fourth day? Or how could the earth bring forth grass
e herb yield seed, or the fruit tree yield fruit after his kind, before
un of nature came into being? These and many other objections
been brought forward by infidels and scoffers, against the authenticity
e Word, and by many others who would consider themselves sorely
ieved by having these terms applied to them, many who are indeed
est seekers after truth. Let all such know that the Word of GOD as
led to us, and the works of GOD as made known to us through those
ties with which He has endowed us, are never in conflict and never
radict each other, but are always in heavenly correspondence and
tial harmony one with the other. GOD's love in the will, and His
in the understanding, are here called two great lights, and after-
s love is called a greater light, and faith a less, and it is said of love
it shall *rule by day*, and of faith that it shall *rule by night*. The Most
ent church acknowledged no faith but love itself; and the universal
en is of love, no other life being existent in heaven but the life of love.
love is derived all heavenly happiness, which is so great that no
e of it admits of description, or can ever be conceived by any human

Those who are under the influence of love, love the LORD from the
, but yet know, declare, and perceive, that all love, and consequently all
which is of love alone, and thereby all happiness, come only from the
and that they have not the least of love, of life, or of happiness, from
selves. The profundity of the Word is such that as to its inmost sense
s not treat in the least of natural things, but only makes use of them
present and symbolize things that are spiritual, as may be seen from
llowing in reference to a consummated church, as the end of the age,
he end of the world" as it is erroneously translated in the authorized
on. It is written, "Immediately after the tribulation of those days shall
un be darkened, and the *moon* shall not give her light, and the *stars*
fall from heaven, and the powers of the heavens shall be shaken;
here shall appear the sign of the Son of Man in heaven; and then
all the tribes of the earth mourn, and they shall see the Son of Man
ng in the clouds of heaven with power and great glory. And he shall
his angels with a great sound of a trumpet, and they shall gather
her his elect from the four winds, from one end of heaven to the other".
t. xxiv. 29-31). By all these expressions are meant spiritual things re-
g to the Church, of whose final state or period they are spoken, for in the
ual sense, by the sun which shall be darkened, is meant love to the
; by the moon which shall not give her light, is meant faith towards
by the stars which shall fall from the heavens is meant the knowledge
odness and truth. Every intelligent person will know that it is no
possible for the stars in the firmament to fall to the earth, than it
d be for a million of worlds to fall on a pebble by the sea shore. By

A TABLE OF DAILY SAVINGS AT COMPOUND INTEREST.

Cents per Day	*Per Year*	*In Ten Years*	*Fifty Year*
2¾	$ 10	$ 130	$ 2,900
5½	20	260	5,800
11	40	520	11,600
27½	100	1,300	29,000
55	200	2,600	58,000
1.10	400	5,200	116,000
1.37	500	6,500	145,000

By the above table it appears that if a mechanic, or clerk saves 2¾ per day from the time he is 21 till he is 70, the total with interest will amount to $2,900, and a daily saving of 27½ cents reaches the important sum of $29,000. Save all you can in a prudent manner for a time of possible want, but act justly by paying your debts, and liberally by assisting those in need, and helping in a good cause.

On Profane Swearing—Let every man do his best to discountenance this abominable habit, and shun it as an accursed sin in every possible way. No respectable person will allow himself to be guilty of it. Business men who make a practice of it will find themselves avoided by the best class of customers, for I know that some persons can suffer no mental punishment equal to that inflicted by being compelled to listen to profane language. Besides, every man known as a profane swearer, will not be credited by those whose good opinion is worth having, even when he may be speaking the truth.

Act Well Your Part, Don't be Selfish.—Remember that it is by imparting happiness to others, and making ourselves useful, that we receive happiness. Stand by this truth, live it out, and always keep doing something useful for the common good, doing it well, and acting sincerely. Endeavour to keep your heart in the attitude of cherishing good will to all, thinking and speaking evil of no one, and always with a kind word for everybody. Selfishness is its own curse; it is a starving vice. The man who does no good gets none. He is like the heath in the desert, neither yielding fruit nor seeing when good cometh, a stunted dwarfish, miserable shrub. Let all your influence be exerted for the purpose of doing all you can for the common good, and individual welfare of every one.

Marriage Maxims.—A good wife is the greatest earthly blessing. A wife never makes a greater mistake than when she endeavours to coerce her husband with other weapons than those of love and affection. Those weapons are a sure pull if he has any thing human left in him. Forbear mutual upbraidings. In writing letters, during temporary separation, let nothing contrary to love and sincere affection be expressed, such letters from a wife have a most powerful emotional effect, sometimes little understood by those who write them. It is the mother who moulds the character and destiny of the child as to the exteriors, therefore let calmness, peace, affection, and firmness rule her conduct towards her children. Children are great imitators, whether they have scolding or peaceful mothers, they are generally sure to learn from the examples set before them, and thus the consequent joy or sorrow is trans-

ferred to other families, therefore let mothers take heed to their conduct. It is not possible to exercise judgment and prudence too much before entering on the married life. Be sure that the affections on both sides are so perfectly intertwined around each other, that the two as it were, form one mind, this requires time; and a thorough mutual knowledge on both sides. Marry in your own religion, and into a different blood and temperament from your own. Bend your whole powers to avoid depreciatory remarks, jibing and anger in every form, and specially avoid everlastingly dishing up any unsuccessful past action that was done from a good motive and with the best intentions at the time. Let nothing foreign to the spirit of love and mutual affection intervene to cause distance between husband and wife; to this end let self-denial rule over each, and reciprocal unselfishness. Avoid habitual fault-finding, scolding, &c., as you would perdition itself; many men tremble as they cross their threshold into the presence of scolding wives. Let husband and wife cultivate habits of sobriety, and specially avoid drunkenness in every form. What a dreadful spectacle it is to see a husband transformed into a demon, tottering homeward to a broken-hearted wife, whose noble self-sacrificing devotion to him seems to partake more of the nature of heaven than of earth. Never part even for a journey, without kind and endearing words, and as a kiss symbolizes union from interior affection, do not spare it on such occasions, repeating it when you return. In one word, let love rule supreme.

Children and Home Conversation.—Children hunger perpetually for new ideas. They will learn with pleasure from the lips of parents what they deem drudgery to learn from books, and even if they have the misfortune to be deprived of many educational advantages they will grow up intelligent if they enjoy in childhood the privilege of listening to the conversation of intelligent people. Let them have many opportunities of learning in this way. Be kind to them, and don't think it beneath you to answer their little questions, for they proceed from an implanted faculty which every true man and woman should take a great delight in gratifying.

Home after Business Hours.—Happy is the man who can find that solace and that poetry at home. Warm greetings from loving hearts, fond glances from bright eyes, and welcome shouts of merry hearted children, the many thousand little arrangements for comfort and enjoyment, that silently tell of thoughtful and expectant love, these are the ministrations that reconcile us to the prose of life. Think of this ye wives and daughters of business men! Think of the toils, the anxieties, the mortification and wear that fathers undergo to secure for you comfortable homes, and compensate them for their toils by making them happy by their own fire side.

Well Worthy of Imitation.—A worthy Quaker thus wrote:—"I expect to pass through this world but once. If therefore, there be any kindness I can do to any fellow being, let me do it now, let me not defer nor neglect it, for I will not pass this way again." Were all to act thus how many would be made happy!

Another Sensible Quaker.—A Quaker lately propounded the momentous question to a fair Quakeress, as follows; "Hum! yea

and verily; Penelope, the spirit urgeth and moveth me wonderfully to beseech thee to cleave unto me, flesh of my flesh, and bone of my bone." "Hum! truly, Obadiah, thou hast wisely said. Inasmuch as it is not good for man to be alone, lo, I will sojourn with thee."

TABLE CONVERSATION.—Instead of swallowing your food in sullen silence, or brooding over your business, or severely talking about others, let the conversation at the table be genial, kind, social and cheering. Don't bring any disagreeable subjects to the table in your conversation, any more than you would in your dishes. Avoid scandalizing people, and never cherish a jubilant feeling over the infirmities or misfortunes of others. The more good company you have at your table the better. Hence the intelligence, refinement and appropriate behaviour of a family given to hospitality. Never feel that intelligent visitors can be anything but a blessing to you and yours.

KEEP THE HOUSE CLEAN AND WELL VENTILATED.—A neat, clean, fresh aired, sweet, cheerful, well arranged house, exerts a moral influence over its inmates, and makes the members of a family peaceable and considerate of each other's feelings; on the contrary, a filthy, squalid, noxious dwelling, contributes to make its inhabitants selfish, sensual, and regardless of the feelings of others. Never sleep in a small close bedroom, either during summer or winter without free ventilation from door or windows, unless otherwise supplied with abundance of fresh air. It will be seen that a person's house usually corresponds to his character.

SAFE BUSINESS RULES.—BUSINESS MEN, in business hours, attend ONLY to business matters. SOCIAL CALLS are best adapted to the SOCIAL CIRCLE. Make your business known IN FEW WORDS, without loss of time. Let your dealings with a stranger be MOST CAREFULLY considered, and TRIED FRIENDSHIP duly appreciated. A MEAN ACT will soon recoil, and a MAN OF HONOUR WILL BE ESTEEMED. Leave "TRICKS OF TRADE" to those whose education was never completed. Treat ALL with respect, CONFIDE IN FEW, WRONG NO MAN. Be never afraid to say No, and ALWAYS PROMPT to acknowledge and rectify a wrong. Leave nothing for to-morrow that SHOULD be done to-day. Because a friend is polite, do not think his TIME is valueless. Have a PLACE for every thing, and EVERY thing in its place. To preserve LONG friendship, keep A SHORT CREDIT, the way to GET CREDIT is to be punctual; the way to PRESERVE IT is NOT TO USE it much. SETTLE OFTEN; have SHORT accounts. Trust no man's APPEARANCES, they are often deceptive, and assumed for the purpose of obtaining credit. Rogues generally dress well. The rich are generally PLAIN MEN. Be WELL SATISFIED before you give a credit, that those TO WHOM YOU GIVE IT are SAFE MEN to be trusted.

APPENDIX TO "THE ARTIZAN'S GUIDE."

ON CORRESPONDENCES.

By reference to page 265 it will be seen that something was stated regarding correspondences, together with an allusion to the appendix for farther information. The amplitude of the subject being very great, no more can be promised here than a very abridged statement by way of illustration. Not being aware that the subject has ever been alluded to in connection with a work of this kind, perhaps some will be inclined to attach a certain amount of blame on account of introducing it here, as there is *apparently* but very slight relationship between the subjects treated of throughout this work and the topic under consideration. But inasmuch as it is believed that its consideration will fulfil a much needed use and command the approbation of all good men, the censure of others is but little regarded in comparison Furthermore, the discrepancy is only apparent, for many things mentioned in this book, together with thousands of other things, will be comprehended just in proportion as correspondences are understood; consequently any effort that tends to dissipate the obscurity, and enlighten the darkness, with which, as regards this subject, many minds are beclouded, must be productive of good, while the knowledge in question will enable us to account for many of the phenomena of the visible creation, such as chemical affinities, the constitution and qualities of different kinds of metal, and their action on each other, besides suggesting innumerable instructive thoughts on other interesting questions of a purely natural kind: nevertheless the writer desires to state that his motive for considering the subject in this place, is a desire to give a few examples of the working of the principle as an unerring rule in unfolding the true meaning of the Sacred writings, for, strange as the assertion may appear to many, the meaning of the Divine Word as to its true or internal sense, can be evolved in no other way. It should be known that the WORD being Divine, is composed in a manner different from all other writings whatsoever, being written by pure correspondences, for which reason, through the use of emblems, symbols, types, and representatives, it contains and embraces within its bosom things which regard the Lord, his heaven, the Church, man, and the things of love andfaith, even when such subjects do not in the least appear in the letter while it is being read, for it is a Divine truth, that there are indefinite things in each expression of the *Word*, which appears to man so simple and rude; yea, there is contained therein more than man can ever comprehend, because it is the embodiment of Infinite wisdom, and is as to its inmosts, the Lord Himself. John i -1., Rev. xix, 13 Treat with the utmost reverence therefore, I pray you, whatever has relation to the Word of GOD, for by so doing you do honour to that SACRED NAME which should never be taken in vain. Of all the abounding iniquities of society, none are more destructive of the germs of goodness implanted by our Heavenly Father in man's heart, and none ministers less gratification to the depraved cravings of fallen man, than the profanation of the NAME and WORD of the everblessed GOD. Let every one discountenance this appalling enormity, and beware of it is as he would shun eternal ruin, not only on account of its infamous character as a sin against GOD, but also out of common regard for the feelings of our neighbours.

The science of correspondences unfolds those spiritual laws in accordance with which the word of God is written. The word *correspondence* is derived from the Latin terms *con* and *respondee*, and means, radically, to answer with or to agree. It will serve our purpose here to define it as the appearance of the internal in the external, and its representation there; in other words, internal and spiritual things are mirrored forth and represented in external and natural forms. The WORD throughout, is written with a constant reference to an exact and immutable relation between spiritual and natural things. Various descriptions are there given of the

sun, moon, and stars; of the earth with her mountains, valleys and rivers; of men, animals and plants, gold and silver, brass and iron, and a thousand other things which appear in the natural world. In all these descriptions there is a constant reference to the internal and spiritual causes from which these things exist, and to which they correspond. The WORD, in its literal sense, is thus wrought together with infinite skill, constituting a permanent receptacle of divine and spiritual things. Within are the living principles, the *spirit* and *life* of the Word, of which it is said, "The words I speak unto you, they are *spirit* and they are *life*" John vi. 63. The science of correspondences is to the Word of GOD what the mathematical science is to the phenomena of the material universe. It reveals order, harmony, beauty and Divine perfection in the midst of what seemed to be disorder, uncertainty, inextricable confusion and even contradiction. It is a most melancholy spectacle at this day to see professed expounders of the Word tell their hearers that the Bible is full of errors, that such and such passages contradict each other, and then proceed forthwith to communicate a vast amount of erudite self-derived intelligence in the shape of glosses, comments and explanations, with the only effect of causing real confusion where there never was any, whilst a knowledge of this heavenly science, for such indeed it is, would have enabled them to harmonize all apparent discrepancies at once.

Not so were the men of the most Ancient Church described in those Divinely composed allegories in the beginning of Genesis, previous to that awful apostacy and declension from goodness described under the representation of a flood which swept over the whole earth. They were gifted with such an intuitve knowledge from above, that they could, as it were, read God's word in His WORKS, and learn and think of heavenly things through and by means of the contemplation of corresponding earthly things. For example, when with the natural eye they beheld a mountain, instantly the emotions of their minds would assume a corresponding elevation towards the LORD, for by a mountain in the most Ancient Church was signified the LORD, and all that is celestial from Him, as the good of love and charity; the most ancient people, and all the ancients, even the Gentiles, worshipped on mountains from this origin. Hence it is written, "I will lift up mine eyes to the *mountains* (or hills), from whence cometh my help, my help cometh from the LORD, which made heaven and earth," Ps. cxxi. We may see from this the true reason why the blessed REDEEMER taught the people from mountains, ascended up into high mountains, and abode in mountains to such an extent as is recorded of Him in the gospels. For the sake of farther illustration it may be proper in this place to adduce a harmony of passages where mountains are mentioned, together with the internal sense signified by them. All the high *mountains* covered with the waters of the flood (Gen. vii. 19.) denotes that all the goods of charity were extinguished by falses and persuasions of the false, or what is the same, overflowing wickedness. The ark of Noah resting upon the *mountains* of Ararat, [Gen, viii, 4, 5], denotes the first light after temptation, which is from charity. The children of Shem dwelling from Mesha, as thou goest unto Sephar, a *mount* of the east, (Gen. x. 30.), denotes worship from the truths of faith extending to the good of charity as its end. Abraham's removal unto a *mountain* on the east of Bethel (Gen. xii. 8), denotes the progression of celestial love with which the LORD was imbued in infancy, for by Abraham in the word is represented the LORD as to the divine celestial principle, or divine good. They that remained flying to the *mountains* after Abraham's victory in Siddim (Gen. xiv. 10), denotes the love of self and the world against which the LORD fought from his love for the whole human race. Lot said to ascend from Zoar and dwelling in a cave in the *mountain* (Gen, xix, 30] denotes the obscure good of those who are without the truths of faith. Jacob sacrificing a sacrifice in the *mountain* (Gen. xxxi. 54), denotes worship from the good of love. The angel of the LORD appearing to Moses in the *mount* of GOD (Ex. iii. 2), denotes the divine human manifested in the good of love; ye shall serve God upon this *mountain*, said to Moses (Ex. iii. 12), denotes the perception and acknowledgement of the Divine from love. Moses to stand on the top of the *mount* with the rod of GOD in his hand, during the battle with Amalek, denotes the conjunction of truth divine with the good of charity, and truth in power

from good; Israel prevailing when Moses raised his hand and Amalek prevailing when he let down his hand, denotes that the victory is with those who are in the truth and good of faith when they look upwards to the LORD; but that the false overcomes them when they look down to self and the world, for Amalek represents interior evil. Israel to be planted in the *mountain* of the LORD's inheritance, (Ex. xv. 17,) denotes regeneration, and heaven, from the life of truth and goodness. The Israelites encamped at the *mount* of GOD (Ex. xviii. 5], denotes the new arrangement of truths when about to be conjoined with good in the second stage of regeneration. The LORD came from Sinai, He shone from *mount* Paran (Deut. xxxiii. 2), denotes the proceedure of Divine truth or the law, from Divine good. The *mountains* filled with horses and chariots of fire round about Elisha (2 Kings vi. 17), denotes doctrinals good and true from the Lord. The *mountains* shall bring peace and the little hills by righteousness (Ps. lxxii. 3), denotes love to the Lord and the neighbour, such as it was in the most ancient church. Upon every lofty *mountain*, and upon every high hill, rivers and streams of water, (Isa. xxx, 25), denotes the goods of love and charity, and the truths of faith from them, for, rivers and streams of water signify truths; like one going to the *mountain* of the LORD, to the Mighty One of Israel (Isa. xxx. 29), denotes the LORD as to the good of love and the good of charity. Get thee up into the high *mountain*, lift up thy voice with strength (Isa. xl. 9; xlii. 11), denotes the worship of the Lord from love. He that putteth his trust in me shall possess the land, and shall inherit my holy *mountain*, (Isa. lvii. 13), denotes the Lord's Kingdom where all is love and charity. The glory of the Lord upon the *mountain* east of the city (Ezek. xi. 23), denotes the sphere of celestial love from the LORD. The house and the top of the *mountain* made holy (Ezek. xliii. 12), denotes the Lord's celestial kingdom from the good of love. Judah called a *mountain* in a field, (Jer. xvii. 3), denotes the principle of celestial love in the LORD's Kingdom represented by them. The *mountain* of the congregation in the sides of the north (Isa. xiv. 13), denotes the obscure state where the influx of good, which flows in with light from the LORD, is terminated. Four chariots going out from between two *mountains* of brass (Zec. vi. 1–8), denotes the precedure of doctrinals from the good of love to the Lord and love to the neighbor in the natural degree. The *mountains* shall distil sweet wine and the hills shall melt, when captive Israel is restored (Amos ix. 13), denotes the good of love and charity when the spiritual church is delivered from falses. The LORD of hosts came down to fight for *mount* Zion and for the hill thereof (Isa. xxxi. 4) denotes the omnipotence of divine good and divine truth. Contend with the *mountains* and let the hills hear thy voice (Mic vi. 1), denotes truth speaking with those who are elate of heart in self-love, and with those who are in charity. And it shall come to pass in the last days that the *mountain* of the LORD's house shall be established in the top of the *mountains* and shall be exalted above the hills and all the nations shall flow unto it, and many people shall go and say, Come ye, and let us go up to the *mountains* of the LORD and to the house of the GOD of Jacob, and He will teach us His ways, and we will walk in His paths, (Isa. ii. 2–3). These words are spoken of the New Church to be established by the LORD; by the mountain of the LORD, which shall then be established in the top of the mountains, is understood Zion; and by Zion, is signified the celestial church, and love to the LORD which is communicated to those who belong to that church, that this is the primary principle of the church, and that it shall increase and gain strength, is signified by its being in the top of the mountains, and exalted above the hills; that they who are principled in the good of love shall acknowledge the LORD, and accede to the church, is signified by all nations flowing to that mountain, nations signifying those who are in celestial good, which is the good of love to the LORD, and people, those who are in spiritual good, which is the good of charity towards the neighbor. They of the south shall possess the *mount* of Esau, (Obad. 19), denotes the good of love with those who are in the light of truth. His feet shall stand in that day upon the *mount* of Olives, and the *mountain* shall divide, etc. (Zec. xiv. 4), denotes the advent of the LORD in the good of love and charity, and the church formed by such goods receding from the Jews to the nations. The LORD set upon a high *mountain* and upon a pinnacle of

the temple, by the devil, denotes the extreme temptation combats that he sustained against the loves of self and the world, thus against hell. Let them which be in Judea flee into the *mountains* (Matt. xxiv. 16), denotes salvation in love to the LORD and charity to the neighbor. They shall say to the *mountains*, Fall on us, and to the hills, cover us (Rev. vi. 16), denotes the state of the evil unable to bear the LORD's presence. A great *mountain* burning with fire cast into the midst of the sea (Rev. viii. 8), denotes the love of self in the scientifics of the natural man. From the examples it may be seen that there is an opposite side from love and goodness, when evil is treated of, for who does not know that there are mountains of pride and self-love of a very different kind from the love of the LORD and the neighbor? Other instances could be noted, but enough has been brought forward satisfy the present purpose.

Mention has been made of those ancestors of the human race who existed in the times of primitive integrity, happiness, purity and goodness. Not without the best of reasons did the ancients speak of that period as the GOLDEN age. In modern times, for a similar reason, we speak of the *golden* rule, a heart of *gold*, *golden* fruit, *golden* opinions, *golden* opportunity, etc., and no one is ever at a loss to perceive the correspondence existing between the symbol and the preciousness of the thing or quality represented by it. The nature and qualities of gold are well known. Its red, bright color, corresponding to that of burning fire, is symbolic of love or goodness, as is also the inherent warmth of the metal. No uncombined acid can corrode or dissolve it, acids corresponds to truth falsified, which in other words is evil or wickedness, so "charity suffers long and is kind." The most intense heat has no further effect on gold than to still further purify it, while its intrinsic value renders it a most proper emblem of that desirable quality which it is used to represent or symbolize in the WORD of GOD, viz., that of the good of love from the LORD. Silver in the internal sense of the word signifies truth, and in an opposite sense, the false. From this correspondence we can understand how the solution of silver used in photography is so sensitive to the rays of light, for natural light corresponds to spiritual light, which is the veriest divine truth, or that True Light which lighteth every man that cometh into the world. The *color* of silver is also in correspondence with the resplendency of light. Regarding gold and silver it may be well to state that in the Word they stand in a sort of mutual relation to each other, representing respectively love and wisdom, charity and faith, goodness and truth, will and understanding: the affections, or the feminine principle, and the intellectual, or the masculine principle. From this correspondence arises the mutual affinity these metals have for each other in the numerous intermixtures and appliances in the various arts and manufactures of the world. Inferior metals, such as brass, iron, etc., are used in the WORD to denote a lower degree of goodness and truth. We will now approach the sacred writings to see to what extent these remarks will be confirmed. The river of Eden encompassing the whole land of Havilah, where there is *gold* and precious stones (Gen. ii, 11, 12) denotes the state of the celestial man as to love and faith. Abram's being very rich in *silver* and *gold* (Gen. XIII. 2) denotes the state of the LORD in youth as to celestial good and truth. The Israelites borrowing jewels of *silver* and jewels of *gold* and raiment of the Egyptians (Exodus XII. 35) denotes scientific truths and goods taken away from the evil, and acquired by those who are of the spiritual church. The people offering *gold* and *silver*, and brass, and blue and purple, etc., for the works of the tabernacle, denotes interior things collated and disposed in externals, where they are represented. The *gold* of the ark, and the border of *gold* round about it, denotes good in the inmost, and the common sphere of good which proceeds from the LORD, and contains all. The mercy seat and the cherubim of *gold* denotes the hearing and reception of worship, and approach to the LORD from the good of love. The table of shew bread covered with *gold*, and the border of gold round about it, denotes the reception of all that conduces to the spiritual life in good, and the sphere of good affording protection from evil. The candlestick, its branches, etc., all of *gold* denotes all mental illumination, and intelligence, or the truth of faith proceeding from good. The couplings for the curtains of *gold*, denotes the whole connection and conjunction of truths, thus the whole order and harmony of heaven, preserved by the good of love. The boards of cedar covered with *gold* denotes the whole merit and good of works, thus all the good that sustains heaven, from the good of love, thus from the LORD. The blue, the purple, and scarlet and fine linen of the ephod, embroidered all over with *golden* thread, denotes the universal prevalence of love, and every manifestation of charity and faith imbued therewith. The sockets of the onyx stones made of *gold*, and the chains of *gold*, denotes the subsistence and coherence of all things in the memory grounded in good. All the stones of the breastplate set in *gold*, its rings and chains of *gold*, denote all the goods and truths of the internal man proceeding from the divine good, surrounded by the sphere of good, and their indissoluble conjunction thereby. The bells of *gold* upon the border of the robe of Aaron denote all that is heard and perceived of the church, thus all doctrine and worship to be from good. The plate of *gold* engraved with "Holiness to the LORD" upon Aaron's forehead, denotes illustration and wisdom proceeding from the divine good of the LORD. The altar of incense covered with *gold* denotes the elevation or hearing and reception, of all worship rising from love and charity. Bezaleel, of the tribe of Judah, called and inspired to do these works for the tabernacle, to work in *gold* etc., denotes those who are in the good of love receiving the divine influx, and their exceeding wisdom. In the opposite sense, the ear-rings of *gold* given to Aaron to make the *golden* calf, denote the delight of external loves, which are the loves of self and the world, rendering worship idolatrous, thus the good of the external man instead of the good of love, or divine good, is represented. *Gold* signifies spiritual good, much fine *gold* celestial good. (Psa. XIX. 10.) I counsel thee to buy of me *gold* tried in the fire, that thou mayest be rich, (Rev. III. 18), denotes the good of celestial love derived from the LORD. *Gold* and precious stones (Rev. XVII. 4), denotes divine spiritual good, and divine spiritual truth, both derived from the Word. How is the *gold* become dim, how is the most fine *gold* changed. (Lam. IV. 1), denotes the spiritual and celestial goods of the church lightly esteemed through declension into evil. The precious Sons of Zion comparable to fine *gold*, (Lam. IV. 2), denotes those who are in wisdom from divine truths. *Gold*, *brass*, and *wood*, (Isa. lx. 17.), represent the three celestial principles, the inmost principle is represented by gold, the inferior by brass, and the lower by wood. The use of the *gold* and *silver* vessels belonging to the temple of Jerusalem at Belshazzar's feast, while they praised the gods of gold, and of silver, of brass, of iron, of wood, and of stone, (Dan. v. 2,3,4), denotes the profanation of the knowledges of good and truth by those who are in falses, his kingdom being divided, signifies the dissipation of goods and truths, and he himself being slain that night, signify the privation of the life of good and truth, consequently, damnation. And the street of the city was pure *gold*, as it were transparent glass. (Rev. XXI. 21.) By the city, or New Jerusalem, is meant the LORD's New Church as to every thing pertaining to it interiorly considered, or within the wall; by gold is signified the good of love from the LORD, and like unto pure glass, signifies pellucid or transparent from divine wisdom, and since the latter appears in heaven as light, and flows from the LORD as a sun, just as natural light flows from the natural sun; by like unto pure glass is signified flowing in together with light from heaven from the LORD. Regarding the LORD's coming it is written, But who may abide the day of His coming? and who shall stand when he appeareth? for He is like a refiner's fire; and he shall sit as a refiner and purifier of silver, and he shall purifiy the sons of Levi, and purge them as *gold* and *silver*, that they may offer unto the LORD an offering in righteousness. Then shall the offering of Judah and Jerusalem be pleasant unto the Lord, as in the days of old, and as in former years (Mal. III. 3, 4). By Levi in a supreme sense is signified love and mercy, in a spiritual sense, charity in act; consequently the sons of Levi signify those who are in the affection of truth and live in the good of life. The name denotes *to adhere*, by which in the Word, is signified conjunction through love, by the refiner's fire is denoted temptation, whereby is effected purification, which is here meant by purifying and purging them as gold and silver. By Judah is signified the Lord's celestial church, or those who love the Lord above all things, and by Jerusalem those who are in neighhourly love, the offering they will bring unto the Lord is faith and charity, by the days of old and former years are meant the ancient churches, and the states of the worship of the Lord at that time. It is obvious that the sons of Levi mentioned in this passage cannot mean those who were officiating as priests during the time of our Redeemer's incarnation, for they were of that outrageously wicked crew who wilfully crucified the Lord of Glory. In the internal sense of the Word the twelve tribes of the children of Israel signify the church as to all its goods and truths; the same is signified by the twelve disciples of the Lord, and by the twelve gates and twelve foundations of the New Jerusalem, as it is stated regarding these last, that names were written thereon, which were respectively, the names of the twelve tribes of Israel and those of the twelve apostles of the Lamb. Jerusalem adorned with *gold* and *silver*, (Ezek. XVI. 13), the temple with its *gold* and *silver* claimed as the Lord's, (Hag. II. 8) denotes the church gifted with wisdom and intelligence, or celestial and spiritual knowledge. *Gold* and *silver* made into images of men, and whoredom committed with them, (Ezek. XVI. 17), denotes profanation predicated of celestial and spiritual knowledges. The ships of Tarshish to bring *silver* and *gold*, (Isa. LX. 9), denotes knowledges when the Lord's kingdom is established, by which truths and goods are acquired. He who is without *silver* invited to buy and eat, denotes such as are in ignorance of truth, but in the good of charity. *Silver* and *gold* gotten by Tyre (Ezek. XXVIII. 4, Joel III. 5) denote intelligence, or what is the same, truths and wisdom. *Silver* purified seven times (Ps. XII. 6), denotes divine truth. It is hoped that these examples will suffice to elucidate the statements made regarding the symbolic or representative sense of gold, silver, etc., in the Word.

As regards the correspondence of the sun, moon, and stars, it will be seen from what follows that these natural luminaries are also used by the Divine Author of the Word to represent spiritual and heavenly things, and in an opposite sense, things that are evil. The Sun, in the Word when the Lord is spoken of, signifies his divine love, and at the same time His divine wisdom. Forasmuch as the Lord with respect to His divine wisdom, is meant by the sun, therefore the ancients in their holy worship turned their faces to the rising sun, and also their temples, which practice is still continued. The Moon, in the Word signifies the Lord in reference to faith, and thence faith in the Lord. Stars, in a supreme sense, signifies knowledge concerning the Lord, hence stars signify intelligence of a spiritual kind, or the knowledge of good and truth, which is true wisdom. These statements will now be confirmed from the Word. "And He shall be as the light of the morning when the *sun* riseth, even a morning without clouds, as the tender grass springing out of the earth by clear shining after rain" (II. Sam. xxxiii., 4,). The light of the morning when the sun riseth, signifies the divine truth proceeding from the Lord as a sun, a morning without clouds denotes the purity of that truth, rain signifies its influx, and the tender grass springing out of the earth signifies intelligence, and reformation thence originating, for these are signified by grass, because grass springs out of the earth by virtue of the sun of the world after rain, and intelligence is from the Lord as a sun by the influx of divine truth. Morning is used in the Word to denote every particular coming of the Lord, or when there is faith and love in the church, the *evening* or night denotes a time or state in which these are wanting. "Blessed of the Lord for his land, for the precious things of heaven, for the dew, and for the deep that coucheth beneath, and for the precious fruits brought forth by by the *sun*, and for the precious things put forth by the *moon*" (Deut. xxxiii. 13, 14.]. This particular blessing was pronounced on Joseph, for the reason that by Joseph are understood the spiritual celestial, who are the highest or supreme in the spiritual kingdom. By his land is signified that Kingdom, likewise the church thence derived. By the precious things of heaven, the dew, and the deep that coucheth beneath, are signified things that are spiritual celestial in the internal and external man. By the precious things brought forth by the sun and the precious things put forth by the moon, are signified all things which proceed from the Lord's celestial kingdom, and all which proceed from His spiritual kingdom, consequently all the goods and truths which are thence derived. "Praise ye the Lord, praise ye Him all His hosts. Praise ye him *sun* and

praise Him, all ye *stars* of light" [Psa. cxlviii. 2, 3]. Here by
g the LORD is signified to worship Him. By the angels are signified
vho are in divine truths from the good of love, for all such are
. By all His hosts are signified goods and truths in their whole
ss. By the sun and moon are signified the good of love, and the
rom that good. By the stars of light are signified the knowledge of
rom good. Inasmuch as man worships the LORD from those things
he receives from the LORD, thus from the goods and truths that
him, and as it is also by virtue of such things that man is man, it is
re said to such things namely, to the sun, moon, and stars, by
are signified goods, truths, and knowledges of truths, that they
worship the LORD. It is clear that the command is not addressed
e luminaries which enlighten the natural world, for how can such
offer praise and worship? And GOD made two great lights, the
light to rule the day, and the lesser light to rule the night, He
he *stars* also [Gen. 1. 16]. The subject treated of in this chapter is
w creation or regeneration of man, that is of those who constituted
st Ancient church which is here described in the literal sense of the
by the creation of the heavens and the earth, those who imagine that
scription applies to the creation of the natural universe are much
ed, for how could day and night, or light have an existence previous
creation of the sun, which according to this account did not come
ing until the fourth day? Or how could the earth bring forth grass
herb yield seed, or the fruit tree yield fruit after his kind, before
of nature came into being? These and many other objections
een brought forward by infidels and scoffers, against the authenticity
Word, and by many others who would consider themselves sorely
ved by having these terms applied to them, many who are indeed
t seekers after truth. Let all such know that the Word of GOD as
d to us, and the works of GOD as made known to us through those
s with which He has endowed us, are never in conflict and never
dict each other, but are always in heavenly correspondence and
l harmony one with the other. GOD's love in the will, and His
in the understanding, are here called two great lights, and after-
love is called a greater light, and faith a less, and it is said of love
shall *rule by day*, and of faith that it shall *rule by night*. The Most
t church acknowledged no faith but love itself; and the universal
is of love, no other life being existent in heaven but the life of love.
ove is derived all heavenly happiness, which is so great that no
of it admits of description, or can ever be conceived by any human
Those who are under the influence of love, love the LORD from the
nt yet know, declare, and perceive, that all love, and consequently all
ich is of love alone, and thereby all happiness, come only from the
and that they have not the least of love, of life, or of happiness, from
lves. The profundity of the Word is such that as to its inmost sense
not treat in the least of natural things, but only makes use of them
esent and symbolize things that are spiritual, as may be seen from
owing in reference to a consummated church, as the end of the age,
e end of the world" as it is erroneously translated in the authorized
. It is written, "Immediately after the tribulation of those days shall
be darkened, and the *moon* shall not give her light, and the *stars*
all from heaven, and the powers of the heavens shall be shaken;
ere shall appear the sign of the Son of Man in heaven; and then
ll the tribes of the earth mourn, and they shall see the Son of Man
in the clouds of heaven with power and great glory. And he shall
is angels with a great sound of a trumpet, and they shall gather
er his elect from the four winds, from one end of heaven to the other".
xxiv. 29-31). By all these expressions are meant spiritual things re-
o the Church, of whose final state or period they are spoken, for in the
al sense, by the sun which shall be darkened, is meant love to the
by the moon which shall not give her light, is meant faith towards
y the stars which shall fall from the heavens is meant the knowledge
dness and truth. Every intelligent person will know that it is no
ossible for the stars in the firmament to fall to the earth, than it
be for a million of worlds to fall on a pebble by the sea shore. By

the sign of the Son of Man in heaven, is meant the appearance of Divine truth in the Word from Him; by the tribes of the earth which shall mourn, is meant the failure of all truth which is of faith, and of all good which is of love; by the coming of the Son of Man in the clouds of heaven with power and great glory, is meant the presence of the LORD in the Word, and revelation; by the clouds of heaven is signified the literal sense of the Word, by power and great glory is meant its internal sense, which has reference solely to the LORD and His kingdom, in each and every passage, and from this, that sense derives its power and glory; by the angels with a great sound of a trumpet is meant heaven. whence divine truth comes, by gathering together the elect from the four winds, from one end of heaven to the other, is meant a new heaven and a new Church, to be formed of those who have faith in the Lord and live according to His precepts. "Behold the day of the LORD cometh, for the *stars* of heaven and the constellations thereof shall not give their light, the *sun* shall be darkened in his going forth, and the *moon* shall not cause her light to shine, (Isa. xiii., 9-10). I will cover the heaven and make the *stars* thereof dark, I will cover the *sun* with a cloud, and the *moon* shall not give her light, (Ezek. xxxii. 7-8.) The day of the LORD is near, the *sun* and *moon* shall be darkened, and the *stars* shall withdraw their shining, (Joel, iii, 14-15.) The same idea is visible in all these passages. By the day of the LORD, is meant His advent, which was at a time when there was no longer any good of love or truth of faith remaining in the Church, or any knowledge of the LORD, therefore it is called a day of darkness and thick darkness. From want of knowledge respecting the spiritual sense of the Word, as unfolded by the science of correspondences, many Christians at the present day suppose that the LORD will appear in the clouds of the atmosphere, and, accompanied by the whole of the heavenly host, will be visible to the natural eye, when the dead bodies and mouldering dust of all who have ever lived on the earth will be raised (at the sound of the archangel's trumpet), out of their graves, and wherever else their dust may be scattered, no matter what form they may have assumed. It is thought this inconceivable mass of corruption will be raised up, and the soul of each be re-implanted, the judgment set, and the books opened, each one being judged out of what is written in those books, just as if the Omniscient ONE could possibly require a set of books; that then the earth and all that is therein will be burnt up, the stars fall from heaven and the sun and moon be blotted out from the creation. Many good people entertain these thoughts because things are thus described in the letter of the Word, but the case is far otherwise, for it is most true that by *clouds* in the Scripture is meant the Word in the letter, for it is written that "His strength is in the *clouds*," that "His truth reacheth unto the *clouds*," that "He maketh the *clouds* His chariot," that "His faithfulness reacheth unto the *clouds*,' that the "*clouds* are the dust of His feet; that thick clouds are a covering to Him. In his unclouded purity, He is described as a "morning without *clouds*.' These and many other similar expressions can never be predicated of the clouds of nature, but that they are true of the Word is most clearly manifest; hence, when the LORD is spoken of as coming in the clouds of heaven, a literal or personal coming is not to be understood or expected, but instead thereof, on unfolding or opening of that spiritual or internal sense of the Word which has hitherto lain so deeply concealed within the clouds of the letter, and which as to its inmost is the LORD Himself, and though the announcement may seem premature, this coming has actually taken place during these latter days by and through the disclosure of that sense to mankind. But more regarding this in what follows. When rightly understood, the Word teaches that the only resurrection that will ever be accorded to man's body consists in the raising up of the soul or spiritual body, which takes place immediately after natural death, and after death, the judgment. This does not take place in this world, but in the spiritual world into which every one enters after the death of the body, the books which will then be opened, and from which he will be judged, signify the interiors of the mind of man, because in them are written all things appertainig to his life.

Another resurrection is indeed spoken of in John v.25., as follows;— "The hour is coming, *and now is*, when the dead shall hear the voice of the Son of GOD, and they that hear shall live ; plainly indicating a resurrection from the graves of carnality and the love of self and the world, which is spiritual death, to the life of spiritual mindedness, and the love of the LORD and the neighbor, which alone is true life. This resurrection must take place during man's life in the body, it cannot take place after death, for such as the ruling love is in this life it will irrevocably remain to all eternity. It is also a great fallacy to infer from any description in the Word, that this earth will ever be destroyed, no such doctrine being ever taught or inculcated therein. In the modern discoveries of geology, the testimony of GOD through His works, points unerringly to the sublime truth that Infinite power has been constantly engaged during countless millions of ages in preparing the earth for the abode of man. It has been created that the human race might exist, and thence heaven, for the human race is the seminary of heaven, and when infinite Love is satisfied to its fullest capacity with intelligent and rational beings on whom it may shower its blessings and celestial beatitudes, for it creates them for no other end, then, just so soon, but no sooner, will the procreations of the human race cease, and the world become a blank in the creation. The most ample testimony is not wanting to prove that it was He who laid the foundations of the EARTH, that it should not be removed for EVER," Ps. CIV., 5 " He built his sanctuary like high palaces, like the EARTH which he hath established FOR EVER," Ps. LXXVIII 69." The WORLD also is established that it CANNOT BE MOVED." Ps. XCIII. 1. " Say among the heathen that the Lord reigneth ; the WORLD also shall be established that it SHALL NOT BE MOVED, Ps. XCVI. 10. " One generation passeth away, and another generation cometh, but the earth ABIDETH FOR EVER. Eccles I, 4. Of the sun moon, and stars, we read :—" They shall fear thee as long as the SUN AND MOON ENDURE, throughout ALL GENERATIONS." Ps. LXXII., 5. " His name shall endure FOR EVER ; his name shall be continued as long as the sun,"—ver. 17. " Praise ye him, sun and moon : praise ye him all ye stars of light. Let them praise the name of the LORD ; for he commanded, and they were created. He hath established them FOR EVER AND EVER : he hath made a decree which SHALL NOT PASS. " Ps. CXLVIII., 3, 5, 6. These enuciations are certainly all that will be required to manifest the divine intention that the universe shall not cease to exist. A perishing earth is used in the language of correspondences to describe a perishing church in the following and many other passages "The earth is utterly broken down, the earth is *clean dissolved*, the earth is *moved exceedingly*." Isa. XXIV, 19. " The curse *devoured* the *earth* and they that dwell therein are desolate ; therefore the *inhabitants of the earth are burned*, and few men left," Isa. XXIV 6. " For my people is foolish and they have not known me ; they are sottish children, and they have no understanding ; they are wise to do evil, but to do good they have no knowledge, I beheld the *earth*, and, lo, it was *without form and void*, and the heavens, and they had no light." Jer. IV. 22. 23. Here we have the picture of an apostate church in a state of declension from goodness, described by the earth being clean dissolved, as moved exceedingly, as being without form and void, and the inhabitants thereof as being burnt up. It is most evident that neither of these statements can be literally true of the natural earth. It is written in Joel " In those days will I pour out my spirit and I will show wonders in the heavens and in the earth, blood, and fire, and pillars of smoke. The *sun* shall be turned into darkness, and the *moon* into blood, before the great and terrible day of the LORD come," II. 30., 31. The apostle Peter on the day of Pentecost, Acts XI, 16, 21, cites the entire passage from Joel, and refers to it as being fulfilled on that day, but we know as well as we can know any thing, that these great commotions did not actually take place in the kingdom of nature, at that time. Our ever blessed LORD and glorified REDEEMER was seen by the beloved disciple in Apocalyptic vision, as " One like unto the Son of Man, clothed with a garment down to the foot and girt about the paps with a golden girdle. His head and his hairs were white like wool, as white as snow, and his eyes were as a flame of fire, and his feet were like unto fine brass as if they burned in a furnace, and his voice as the sound of many waters. And he had in his right hand seven *stars*, and out of his mouth went a sharp two-edged sword, and his countenance was would be adorned for her husband. Such a glorious system would she have of celestial truth,—such disclosures of heavenly order,—such discoveries of the divine laws as existent in the soul; in the regenerate life; in the heavenly world; in the spiritual sense of the Holy Word; in fact, on all subjects of Divine Wisdom, that to the truly devout and thoughtful spirit, she would truly be "adorned as a bride for her husband."

There is an interesting intimation of the character of true heavenly clothing in Psalm xlv. "The king's daughter is all glorious within: her clothing is of wrought gold. She shall be brought unto the king in raiment of needlework [verses 13, 14] where the character of true celestial doctrine is declared to be the gold of love, wrought into system,—love wrought out. The king's daughter, all such as, animated by pure affections for truth derived from the King of kings, are desirous of graces of the heart and mind, which are worth more than the wealth of kingdoms. They become glorious within, and all their views of doctrine are love as it were speaking, and declaring its true nature. With them, God is love, heaven is love, love is the fulfilling of the law, love keeps the commandments, the Word truly understood, is the revelation of love. Their whole doctrine, like the street of the holy city, is of pure gold, formed by the spiritual embroidery of an intellect which spiritually discerns the harmonious relations of everlasting things. The Word supplies the raw material, line upon line, and precept upon precept. The rational powers weave them into a beautiful system, and prepare them to be worn. And when the judgment, under the impulse of a humble determination to live for heaven, adapts these doctrines to its own especial states and requirements, the Christian is equipped in the garments of salvation. "He is glorious within, and his clothing is of wrought gold."

And here, we would strongly guard against one of the most dangerous delusions which has crept into nominal Christianity; the idea that we are saved by the infinite purity of Christ's righteousness being imparted to us, and not by actual, practical righteousness. It is true, our righteousness is derived from the Lord, "their righteousness is of me, saith the Lord."—Isa. liv. 17. But no righteousness will be imputed to us, which has not been imparted to us. His spirit will be imputed to us, so far as we receive it, but no farther. God is a God of truth, and never imputes to any one what he does not possess. "He that doeth righteousness, is righteous."—1 John iii. 7. The merit of divine righteousness in salvation, is as incommunicable as the merit of creation. The robe of the Saviour's perfections, has a name on it, which no man knows but He Himself. (Rev. xix. 16). And, yet, numbers neglect to acquire the white robe, or the wrought gold, of imparted truth and love, under the vain idea that the personal perfections of our Lord will be imputed to them. Our food is from Him, but if instead of eating that which He now provides, we were to attempt to live by imputing that which he ate in the days of His flesh, we should die of starvation. So, if instead of receiving, and applying to ourselves the living streams of His righteousness by earnest prayer and earnest practice, we expect His merits to be imputed to us, as righteousness, so that although we are really wicked, we shall be accounted good! although really polluted, we shall be accounted clean; we shall be naked and helpless, in the day when he makes up his jewels. No doubt, the Lord lived on earth for our sakes, suffered for our sakes, died for our sakes, rose again for oursakes, made His Humanity righteousness embodied, for our sakes. "For their sakes, I sanctify myself," he said, "that they may be sanctified by the truth."—John xvii. 19. All was done for us to enable us to be sanctified, but not to be put down to our account When our account is made up we shall find the rule to be, "They that have done good shall come forth to the resurrection of life, and they that have done evil to the resurrection of condemnation." John v. 29. He comes quickly to give to every man as *his work* shall be (Rev. xxii. 12). Blessed shall we be, if we watch and keep our garments, made white by His truth, and thus are ready to follow our Divine Leader in the realms of peace, adoring, in humble love, those infinite perfections which make his face to shine like the sun, and His raiment white as the light [Matt. xvii. 2]. We are, then, to speak to the Israelites, who are typified by those of our text the spiritual Israelites, who are as our Lord said, Israelites indeed, and say first that they clothe themselves with genuine doctrines of divine truth, with the garments of salvation, and that they especially make them fringes in the borders of their garments. After we have meditated upon the doctrines of religion, and seen their fitness to our own states of mind and heart, thus clothed ourselves in them; the next part of our duty is to bring them into life. This is a most important point. Many there are, who put on religion as a dress for the head, and even also for the breast, but do not bring it down to the feet. But we are to make a border for our garments, and the border must be a fringe. The distinctive feature of a fringe is, that the material of which it is composed is divided into small portions, firmly united at the upper part, but hanging with separate forms of beauty at the lower. The idea suggested by this is, that religion must be employed in all the small affairs of daily life, as well as on great occasions, the lowest part of our spiritual dress must be a fringe. Our Lord declared the same important truth when he said, "He that is faithful in that which is least, is faithful also in much: and he that is unjust in the least, is unjust also in much."—Luke xvi., 10.

This practical admonition is of the very highest consequence. One of the most serious errors of life is that our religion is only to be brought out on grand occasions, as some think, or on Sundays, as others practically shew, they suppose. The only way in which we make the truths of religion really ours, is to infuse their spirit and tone into all our little acts in our daily conduct. Life is made up of little things. One circumstance follows another, one act comes after another, each one small of itself, but the whole forming the tissue of our entire outward existence. Our whole journey is made step by step. There are no great swoops made. By little and little, we drive out our evils; and by little and little, we introduce the principles of wisdom and goodness into the whole texture of our conduct. By this, we must not be misunderstood to mean, that we are not to subject the whole man to the government of heavenly laws, but only that we are to do it in each circumstance as it comes to hand, and to do it now, not to wait for great occasions. Let the border of your garment be a fringe.

Many, very many, have no objection to the head or the breast being in the church, but the feet they imagine may be quite otherwise engaged. But the true disciple of our Saviour adopts the language of the Psalmist, "Our feet shall stand within thy gates, O Jerusalem."—Ps. cxxii. 2. He is particularly watchful over his feet, or his daily practice. If in his moments of weakness he wavers, he looks up to the Saviour, the Source of strength, and prays, "Hold up my goings in thy paths, that my footsteps slip not."—Ps. xvii. 5. Often will he have to confess, "But as for me, my feet were almost gone; my steps had well nigh slipped."—Ps. lxxiii. 2. Yet will he find invisible hands have borne him up, for his ever-watchful Father has given his angels charge concerning him, lest he dash his feet against a stone.—Ps. xci. 11, 12. And again, and again will he find occasion gratefully to exclaim, "O bless our God, ye people, and make the voice of his praise to be heard: who holdeth our soul in life, and suffereth not our feet to be moved."—Ps. lxvi. 8, 9. If, like Peter, at first, he thinks it quite beneath his Master's dignity to purify the lower concerns of life, and declares, Thou shalt never wash my feet, when he is better informed, and hears the Saviour's words, "If I wash thee not, thou hast no part in me," he, with an entire spirit of self-devotion, exclaims, "Lord, not my feet only, but also my hands and my head."—John xiii. 9.

This religion of daily life is the grand necessity of the world. Without that, our sabbath worship is but an organized hypocrisy. We should pray, that we may be able to practise. not to substitute prayer for practice. Beautiful as is the devout worship of the sanctuary, sweet as is the devotional piety, and soul-exalting as are hymns of gratitude; they are only the unsubstantial beauty of a dream, unless they are brought down to give direction, purity, and strength to daily life. Let there then be a fringe for the borders of your garments, throughout all your generations.

It is for want of this descent of religion into daily life, that its blessings are often very faintly felt. The sweetness of the knowledge of the Lord is only experienced when religion has become a living hourly series of virtues with us. It is said of the disciples who were going to Emmaus, though the Lord walked with them, and they felt the holy glow of his presence when he talked with them on the way, he only became known to them in "the breaking of the bread." It is so with His disciples in all ages. As long as the "bread of life" is received in a mass, and remains thus, the blessing of conjunction with the Divine Being is unknown. He is with them, but as a stranger. But let them break the bread; let them at home and abroad, in the counting-house and on change, in the workshop and at market, in their pleasures and in all their family duties, break the bread of heaven, and apply it to every work and word, and they will then know the Lord. "Then shall we know, if we follow on to know the Lord: His going forth is prepared as the morning, and He shall come unto us as the rain; as the latter and former rain upon the earth."

O, then let our religion not be like a Sunday dress, put on only for parade on state occasions, and put off when the occasion has passed by, but like a simple daily robe, whose usefulness is seen of all, and whose fringe goes all around the hem of our garment, so that it extends over the whole circle of our outward life.

We are, however, not only commanded to have a fringe to our garments, but to have upon the fringe a ribband of blue. And this leads us to consider the correspondence of colors. Natural colors we know originate in natural light. They are the separation of the beauties which are bound up in the sunbeam, and their reflection to the human eye. There is a trinity of fundamental colors, red, blue, and yellow. From the blending of these in varied proportions all others are made. Blue and yellow form green.

Bearing in mind that the Lord is the Sun of the eternal world, and that essential truth shines as a spiritual light from Him, the three essential colors into which light divides itself, will represent the three essential features of divine truth, in its application to man. There are truths of love, which apply to our affections, truths of faith which apply to thoughts, and truths of life. Red, the colour of fire, is the symbol of the truths of love, the fire of the soul. Blue, the colour of the azure depths of the sky, is symbolic of the deep things of the spirit of God, on which faith delights to gaze. Yellow, is the hue of truth which applies to outward life, and in combination with blue it makes green, which corresponds to truth in the letter of the Word, made simple to the common eye of mankind.

Blue gives a sense of clearness and depth, in which it surpasses all other hues. When we gaze into the blue depths of the sky, far above the changes of the clouds, their tranquil grandeur, arching in peaceful majesty far over the turmoils of the world, strikingly images those depths of heavenly wisdom from which the good man draws strength and peace.

"Though round his breast the rolling clouds are spread,
Eternal sunshines settles on his head."

Blue, then, is the colour which represents the spirit of the Holy Word, the depths of heavenly wisdom.

There is, however, cold blue, as it has more of white in it, and warm blue, as it derives a certain hue from red. There has also been some difficulty in determining the exact shade meant by Techeleth, the Hebrew name for this colour. But from a full consideration of the subject we are satisfied it was the name for blues tinged with red, from violet to purple. And this very strikingly brings out the divine lesson by correspondence. While the blue indicates that in our demeanour or in life we should be correct, in harmony with the spirit of truth, the red hue indicates that all our truth ought to be softened, and warmed by love. "Speak the truth in love," said the apostle, and to remind them of this duty, God commanded the ribband of warm blue to be worn upon the fringe of their garments, by the sons of Israel.

Truth without love is cold, hard, and unpitying, and therefore repulsive. Truth with anger is scalding hot, and like medicine, impossible to be taken, useless or injurious; but truth coming from a loving heart, firm, but gentle, and sweet like the warm sunbeam, is welcome to all.

The loving blue of the eye, which reveals the sweet impulses of a soft and gentle heart, is like the color of the ribband, before us; it speaks of the purity and the warmth of the spirit within. Let there, then, be upon all your demeanour this color ot heavenly love.

Seen in this view we have now arrived at, this commandment increases in practical importance the more we contemplate it. Perhaps the neglect of it is the cause of more failures in the delivery of well-meant advice, than any other circumstance. We proceed to correct with the rough, stern hand of truth alone, and we encounter resistance. We are sure we are right, and we proceed to reproach and invective. Quarrels ensue, instead of amendment. We brood over our failure, and wonder at the perversity of mankind, not reflecting that we have not put on the fringe upon our garment, the ribband of heavenly blue.

"O be kind to each other,
The night's coming on,
When friend and when brother,
Perhance may be gone."

Nothing can be farther from the spirit of heaven, than a stern, harsh, vindictive utterance of truth. We should ever remember that we can ourselves only be assisted by one who manifests to us a spirit of kindness in his counsel. To an assailant we close up. We cannot bear our faults to be exposed by one who does it in a spirit of exultation and insolence. But we love the friendly hand which has a brother's touch. We delight to see the dress not starched with prudery, but having upon all its fringe the ribband of heaven's own blue.

With this blessed tone, how often would homes be happy which are frequently torn with dissension. A brother will be gentle from courtesy to others, but is sulky or sharp to his own. A sister, from politeness, will be brilliant and fascinating to visitors, but often fails to wear the blue ribband to those of her own fireside. Oh, if the Christian ministry has one object which more than another should be its constant aim, it should be to contribute to the happiness of home, that sacred centre of all that is elevating, strengthening, purifying, and ennobling among men. And nothing will be a truer source of all these blessings than to speak to brothers and sisters, and say, in all your intercourse with each other, let the spirit of religion be visible. In each small act of daily intercourse with each other, let there be a fringe from your religion within, and on the fringe let the truth of intelligence be blended with the kindness of real love. You were created to learn to be fellow angels in the house. You were placed to walk together on your path to heaven, to give an assisting hand when a weak one stumbles, to exhort the slothful, to cheer the weary, to warn against danger's path and dangerous foes, to encourage the struggling, to rejoice together when you gain a glorious prospect, to animate each other to your daily progress, and often to taste by anticipation the triumph you will have when all the dangers of life are gone by, and heaven is forever your home. Remember the charge of Joseph to his brethren, "See that ye fall not out by the way." In your acts and your words, let there be seen upon all your fringe, the ribband of heavenly blue.

We come, now, to a still dearer connection, which would often be more blest if the spirit of this divine command were more faithfully carried out.

In that most sacred of all human ties, the marriage union, it is of the highest importance that the blue ribband should appear in all the demeanor of husband and wife. Yet, sometimes the domestic hearth is less tender and happy than it might be, for want of the gentle amenities of truth spoken in love. When that mysterious sympathy which attracts congenial souls to each other, first induces ardent thought in the young lovers, the earnestness of affection presents to both only what is amiable and agreeable. Each finds a magnifier of the excellences of the other, and no imperfection can be seen. And, when the hopes of both are crowned by possession, a long vista of happiness is beheld, thronged with an endless succession of joys and blessings. Yet both parties have failings. The perfection fancy has painted, will, in many respects, be found to be overdrawn. The bloom of outward beauty will wear off. Possession will deprive many attractions of the exaggerated value for which they were chiefly indebted to passion. Both are probably young, both imperfect, both are human. Hence, there come discoveries of faults and shortcomings which belong to us all, but which have been before unseen. And now is the opportunity for the manifestation of real love, in having patience with the loved one. If they have loved wisely, the virtues of each other, and that mutual adaptation of feeling, taste, and character which has drawn their souls to desire a union impossible with any one else, have been the chief attractions; and for their sakes, they can well afford to bear with some defects. Instead of being astonished to find that the mere mortals we have married have some of the failings of our fallen race, we should take kindly the opportunities of showing, that ours has not been the selfish passion which desires only its own gratification, but rather the holy affection that, forgetful of self, seeks chiefly the happiness of those we love. To assist, and be assisted, to form angelic characters in each other, these are the chief objects for which marriage has been instituted. And to accomplish these ends, we must have a faithful, but a friendly eye for the imperfections of each other. We should scarcely notice the unpleasant effect of faults in relation to our personal gratification, but be quicksighted to perceive the injury they inflict upon the doer. "Who is so blind as he that is perfect," says the prophet, in reference to that Divine Mercy which sees not our sins so far as they are directed against Him, and condemns them, only as they are fountains of misery to ourselves.

Our Lord washed His disciples' feet, and said, "As I have washed your feet, so must ye wash one another's feet." And if to assist each other, to remove imperfections from our conduct, which is spiritually washing one another's feet, is a duty we owe to our ordinary Christian friends, how much more is it a duty to assist in removing the spots which soil the characters of those we have undertaken to love and to cherish. Yet what tender care this duty needs. The true wife, or husband, cannot bear to think that the deeply-prized love of the other is being lost. Noticing a fault rudely, betrays the appearance of dislike, and wounds deeply. Sometimes, self-love will creep in between married partners, and the struggle for power will take the appearance of opposition to faults. Then lacerated feelings are poured forth in bitter expressions. Then, quarrels arise, long animosities are inaugurated, which take from home its sweetness, banish all those tender endearments, those happy confidences, those heart-felt reliances on each other, those fireside pleasures which constitute earth's nearest likeness to heaven. Then oppositions are engendered, recriminations are heard, hateful everywhere, but intolerable from those we love. Distrusts, fears, and anxieties intrude, where only confidence should reign, and home becomes the saddest abode of misery. All this has happened, will happen, it we are not careful, in our married life especially, to speak the truth in love. There, above all, the blue ribband should be seen upon our garments. Sweetness in our goodness and tenderness in our truth, should be the incessant law of married partners to each other. A fearfulness of injuring the feelings of the other: A friendly, kindly touch, when any mental sore requires attention: A determination to do nothing, which does not manifest a constant affection: A deference to each other's wishes: A manifest active effort to promote the other's happiness; Thesse are the dispositions which can alone preserve and complete that choicest of all Divine Blessings—genuine conjugal love.

When misunderstanding has been sustained, and bruised affections manifest how deeply they are hurt, their pain should not be treated lightly. He would be thought cruel who trampled on the inflamed foot of another, yet the anguished heart is sometimes tortured with stinging words of bitterest taunt and reproach, under the delusion that it is necessary to blame where fault has been committed. The first necessity is to bring ourselves into a state of real kindness and affection; then ascertain if the supposed fault be as real as it appeared. If so, to ask for Him who views us all from kindness, for wisdom, first pure, then peaceable, to speak the truth in love. While our ribband is blue, to take care that it is soft and warm. How desirable this is in our intercourse with others! In our intercourse with those who are to form with us the happiness of heart and home, it is indispensable.

And yet it is not at all uncommon for unwise married partners so far to neglect this divine commandment as to be all smiles to others, and to reserve their coldness for those whom they should most fondly cherish. The husband open, smiling, and sedulously polite to any other lady, will be reserved, negligent, uncourteous, and unkind to the heart which should be to him above all price. The wife, all-radiant with smiles to others, attentive to their minutest wishes or comforts, will not trouble herself to retain or regain the affections of that one, on whom all her real happiness depends. The gentle, conciliating word, for which her husband's heart, beneath a firm exterior, is longing, she will not speak. The one she won by gentleness, and grace, and all the feminine virtues,she will not preserve by growing in those virtues, but rudely repels. And the heart whose faintest throb she once valued beyond all earthly riches, she rudely throws away.

O married partners, tenants of the same home, who should be all in all to each other, for time and for eternity, never neglect in your sentiments, your spirit, your acts, and your words to each other, to let there be visible on all the manifestations of character with which your life's dress is fringed, the truth and the love of celestial blue. O wife, matron, mother, remember your strength is in tenderness. Never shock the feelings of your husband by harsh, bitter, unwomanly exasperations. Your peculiar province is at home ; let it be ever preserved sacred to domestic peace, by a meek and quiet spirit. So you will be your husband's dearest trust, and chief consoler ; your children's constant refuge ; and when you have passed beyond the shades of time, the star of fond remembrance that shines high above the cares of earth, and lures them still to heaven.

O husband, O father, on whom the wife's fond heart desires to lean, let no harsh expression drive her thence. A yearning of unspeakable tenderness keeps you within her presence, mentally, wherever you may be from morn to dewy eve. And, when you return, she expects the friendly greeting ; let her not be disappointed. Be assured her love would encircle you, if you were driven from the common ranks of men ; her heart would be the truest pillow for your aching head. Her grace, her happiness, is the worthiest ornament for you now. Your strength is cold, repulsive, and forbidding, until it is combined and chastened by the gentleness and sweetness of your faithful, loving wife. Let her be cheered, then, to see upon the fringe of your garments, the clearness and the warmth of true celestial blue.

It is equally important that the firmness and clearness of truth, blended with the warmth and gentleness of love, should be visible in all our intercourse with our children. Firmness, without gentleness and cheerfulness is painful and repulsive to children, and they shun the circle of its influence as much as possible. Softness, without firmness, strengthens their hankerings for selfish indulgences, and increases those disorderly demands which at length must be restrained with rigor, a hundred-fold more painful, or they must sink in ruin. Children look for just direction, and their sense of justice leads them readily to acquiesce in what is right when it comes from lips they love. Only let the true blue ribband be seen by your children always, and they will follow where you lead, and your counsel will be laws they will revere in your absence as well as in your presence ; and when the music of your loved voice will be heard by them no more, its recollections within will be prized as the tones and the wisdom of those dearest and best-beloved ones who piloted them safely in the early walks of life, and still have only gone before them, and are waiting to welcome them on the purer plains of heaven.

This attention to the very externals of the Christian life is fraught with blessing every way. It is only thus, in fact, we can obtain strength to be healed of our spiritual diseases, and only thus we can exhibit the worth of our principles to others. When the poor woman who had spent her all upon helpless physicians for twelve years came to Jesus, she said within herself: If I touch but the hem of his garment, I shall be made whole, and as soon as she did so, virtue went out, and she was healed.

In the hem of the vesture of Divine Truth, or in other words, in the literal sense of the Word of God, the divine virtue is ever present for the meek and lowly, and when it is touched by trusting love, that virtue will go out.

The prophet Zechariah, speaking of the glorious church of the latter days, the church which is now unfolding itself amongst us, the New Jerusalem, declares, " Thus saith the Lord of hosts : In these days it shall come to pass, that ten men shall take hold out of all languages of all nations, even shall take hold of the skirt of him that is a Jew, saying " We will go with you ; for we have heard that God is with you."—viii. 25. It is religion in life that is observed by, and is attractive to, good men. When it not only enlightens the head and rules the heart, but comes down to the skirts of the garment, infusing justice, kindness, and courtesy into every act and every word, then it has an eloquence which will inspire many a well-disposed heart to say: " We will go with you, for we have heard that God is with you. Let your good works, and your good words so shine before men, that they may glorify your Father which is in heaven."

While you pay due and supreme attention to the interior principles of love and faith, never forget the fringe. Let your religion come out. Be loving and truthful in little things. Let your daily duties, and daily expressions unbosom in them the spirit of heaven in their entire round, and thus upon the fringe let there be seen THE RIBBAND OF BLUE.

EXPERIENCE OF A SUN REPORTER IN NEW YORK.

Slightly altered from N. Y. Sun.

A *Sun* reporter being desirous of finding out something definite regarding the New Church doctrines, proceeded to No. 20, Cooper Institute, New York, and inquiring who was the head man of the denomination, a gentleman [Mr. Thomas Hitchcock] answered:—

There is no head man in our denomination; that is to say, there is no one whose lead we follow without question. We all think for ourselves, although, of course some are more familiar with the writings of Swedenborg than others.

Reporter. Do you understand the doctrines ?

Mr. H, I do, I have studied them about twenty-one years.

Reporter. Well, what are you Swedenborgians driving at?

Mr. H. We think we have got the true science of religious truth, and want to teach it to the world.

Reporter. Science of religious truth! Do you mean to say there is any science in religious truth?

Mr. H. We mean to say, and we do say, that religious truth is as capable of scientific arrangement and explanation as any other truth, and that we are able to give this scientific explanation. The NEW CHURCH theology bears the same relation to all other theologies that the Copernican system of astronomy bears to the Ptolemaic, the Arabic, the Hindoo, and the Chinese systems of astronomy. Those systems of astronomy were based on the mistaken appearance of things, whereas Copernicus and his followers got at the realities. Just so other systems of theology are based on appearances, while the NEW CHURCH system is based on the real truth.

Reporter. What do you mean by " appearances"?

Mr. H. I mean the way that things *appear* to the senses. For example, the sun *appears* to rise and set, and to go daily round the earth. The sky *appears* to come down to the earth all around, forming what we call the horizon. The earth *appears* to be stationary in the centre of our universe. The sun *appears* to be a small orb, not a millionth part as large as the earth; the planets seem no bigger than marbles, and the fixed stars *appear* to be mere twinkling points. All these appearances are controverted by science, and the senses have to yield to reason. It is the same in spiritual and religious matters, which abound with fallacious and misleading appearances, and these appearances have to be corrected, and in the NEW CHURCH system of theology are corrected by spiritual science.

Reporter. That all sounds very well, in a general way; but let us get at something specific: What do you say for example to the doctrine of total depravity? I used to know a pious old lady, when I was a boy, who was strong on that doctrine, and who always closed every argument on the subject by saying, "Well, when you take away my total depravity, you take away all my religion," What do you say to that?

Mr. H. Our doctrine as to that matter is, that all human beings are born with sinful inclinations, (and of themselves are nothing but evil), but need not commit sin unless they choose to do so, and are not accounted guilty of sin unless they actually commit it.

Reporter. Then you hold that all children that die before they reach the age of moral accountability go to heaven, no matter how wicked or heathenish their parents may be.

Mr. H. We do most emphatically; it is a monstrous error to suppose otherwise.

Reporter. But if no infants whatever go to hell, what becomes of the doctrine of infant damnation?

Mr. H. I'm sure I can't say, unless it goes where it would send the infants, as it certainly should.

Reporter. But if the doctrine of total depravity is not true, what need have we of a Saviour?

Mr. H. To save us from our sinful inclinations, and from actual sin committed by every one personally.

Reporter. How did He, or how does He do that?

Mr. H. It is not easy to tell off-hand how He does it. In order to explain it, it is necessary in the first instance to explain our views of the intimate connection between this world and the spiritual world, including both Heaven and Hell.

Reporter. That is just what I want to get at, please go on?

Mr. H. The spiritual world is not remote from this world, on some unknown planet, as is commonly supposed. It is right here, close to this world, and within it. When a good man lives a good life, he draws angels and good spirits, who inhabit the spiritual world, near him; if he lives an evil life, he draws evil spirits and devils around him.

Reporter. What is the difference between a good spirit and an angel and an evil spirit and a devil?

Mr. H. A good spirit is a good human being who has passed from this world, but who has not yet become an angel. An angel is a good human being who has been perfected in the spiritual world up to the status of angelhood, and been thereby elevated into heaven. An evil spirit is a wicked human being who has passed from this world, but has not yet become a devil. A devil is a wicked human being, who having passed into the world of spirits, has blossomed into full blown devilhood, and gone to his home in hell.

Reporter. You talk about the WORLD OF SPIRITS, as though it were a a place to which good and bad spirits go in common, previous to their being sent to heaven or hell.

Mr. H, Yes, the world of spirits is an intermediate state between heaven and hell. It is where all go immediately after death, before we are finally arranged and disposed of according to our real characters. Now to come back to the spirits which a man draws about him in this world by his life, and on which I must predicate my explanation of the work of salvation which the Saviour did for us; By the instrumentality of good spirits and angels, the LORD is always trying to save us from the machinations of evil spirits and devils. But when the human race is unspeakably wicked, as it was at the time of the Lord's appearance on earth, special efforts to this end are necessary. At the time of our Saviour's advent, the evil spirits and devils had got such a hold upon men as to take possession not only of their minds and hearts, but of their bodies also, as we read in the Gospels, and the instrumentality of angels and good spirits was not sufficient to resist them. The LORD, therefore came Himself down to the plane of human life, and on that plane fought with his own Omnipotence against hell, and its allies, drove them back, and thus saved man from destruction.

Reporter. Do you mean that it was GOD Himself who did this?

Mr. H. Yes, I do. There is but one GOD. The Son of God is the name given to His manifestation of Himself here on earth, and the Holy Spirit is the holy influence that proceeds from Him.

Reporter. What becomes of the vicarious atonement then?

Mr. H. The vicarious atonement, as expounded by old fashioned theologians, is a misconception of the truth, just as the Ptolemaic system of astronomy was a misconception of astronomical facts. It rests upon the assumption that God was angry with His creatures and needed to be pacified, and would not be reconciled to the offenders until some one had been adequately punished for their offences. God's alleged anger is only an appearance induced by our guilty conscience. The truth is that God loves the sinner just as much as He loves the saint, and always seeks the sinner's good, for "His tender mercies are over all His works," extending even to the lowest hell. The infinite love of our Heavenly Father is such that He "makes His sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust" and "is kind to the unthankful and to the evil." To remove the appearance of anger, it is only necessary for us to repent of our sins and turn to the Lord; just as, to come from night to day, it is necessary for the earth to turn, and not for the sun to change its position. The sun shines on just the same all the time, whether it be hidden by clouds or shut out from us by the earth's turning away from it; and so, too, does the Lord's love shine on just the same all the time, no matter how it may be obscured by the clouds of evil, or shut out from our hearts by our turning away from the Lord. So you see that redemption was a deliverance from the powers of hell, to enable us to turn again to God, and was not a deliverance from the wrath of God, as the phrase is usually understood. The work which the Lord did in redemption was indeed vicarious. He did in our place what we could not do for ourselves. Atonement again, means reconciliation—or, as it is sometimes spelled at-one-ment, and it is we who are reconciled to God, and not God to us. He does not need any reconciling, but we do, because it is we who have gone astray. It is we who must be brought back. To repeat our astronomical illustration, there is no change in God any more than there is in the sun; it is the earth that must turn in order to receive the sun's heat and light. Sin is the great cloud that intercepts the heat and light, or the divine love and wisdom, proceeding from the Sun of Righteousness, "Your iniquities have separated between you and your God, and your sins have hid His face from you."

Reporter. All the preachers say the same thing, that we must turn to the Lord and seek salvation. Is your way of doing that different from theirs?

Mr. H. I will not attempt to state their method, but will only tell you what ours is. Our way of turning to the Lord is to repent of one's sins, pray to the Lord for help, and above all to keep the commandments.

Reporter. That seems to be orthodox. I was brought up a Methodist, and that is just what they preached. There does not seem to be much practical difference, after all, between you and the rest of the religious world.

Mr. H. I should be very glad to believe that that was so. The use of all religion is to make good men and women on earth, and angels in heaven; so far as the Methodist, Catholic, or Mahometan religion can do that, it has my hearty sympathy. Indeed Swedenborg teaches that in the providence of the Lord, believers of all forms of religion are saved if they only lead good lives, according to their religious precepts.

Reporter. What is the advantage of your form of religion then over others?

Mr H. The advantage consists in being free from the errors and misconceptions which embarrass and mislead believers in other systems.

Reporter. What errors and misconceptions do you refer to?

Mr. H. That of God's being angry with us and demanding a victim to appease his wrath, for example, and the consequent misconception of the real nature of the atonement, the trinity of three distinct persons, the doctrine that heaven and hell are arbitrarily given by the Lord, and are not the result of eternal laws, these and kindred errors following from them, puzzle and confuse people's minds and prevent them from doing as well as they would if they knew the truth.

Reporter If the Lord does not send a man to hell, who sends him there?

Mr H. He goes there of his own accord, and because he likes it better than he likes any other place.

orter. If you will enable me to comprehend that, and see that it is
you will contribute much to my peace of mind.

. *H*. How so? would it contribute to your peace of mind to see that if
hould ever become an inmate of one of those loathsome hells of the
h or sixth ward of New York,—say a negro dance-house,—it would
cause you had become so degraded that you would go there, and live
, and make your living by living there, from pure love for such a

orter. The very idea makes my soul turn sick.

. *H*. Very well, then how can it contribute to your peace of mind
and believe that if you go to hell from the world of sprits it will be
use you will have become so vile and loathsome in all the attributes of
spiritual nature that you will prefer the society of devils to that of
ls, and the wickedness and corruption of hell to the purity and holi-
of heaven?

orter. On reflection I do not think my peace of mind would be much
forced by such a belief. But I want you to explain how people go
the spiritual world to heaven or to hell.

. *H*. Before I do that, tell me what your idea of heaven is.

orter. Heaven is the eternal home of the redeemed, it is the home of
ending rest, it is a place of eternal happiness.

. *H*. What makes heaven a place of happiness?

orter. Why, GOD makes it so, of course.

. *H*. But how does he make it so? In what does the happiness of
en consist?

orter. Why, in being happy, I suppose. And the redeemed are made
y by contemplating the glories of their Redeemer; by singing endless
es to Him, by wearing golden crowns and robes of spotless white, and
ing those sweet fields which as the old hymn says, beyond the swelling
stand dressed in living green.

. *H*. That is to say, the happiness of heaven, according to your views,
sts in what might be termed a never ending religious holiday with
ng to do except to sing praises to God, and feast on what you call
enly delights?

orter. Yes, that is about it.

. *H*. How would you like that here on earth? How would you like
nd in a temple or a garden for years, wearing a white robe, and
a gold crown on your head, and a gold harp in your hand, and with
ng to do but to sing psalms? Or to put it briefly, how would you
to live in everlasting idleness here if you could.

orter. It would be intolerable, of course. It would kill me or drive
razy.

. *H*. Exactly, just as it has killed or driven mad many a man who,
g amassed wealth, and foolishly imagined that it would be heaven on
to live in splendor and idleness, has supplied himself with a luxurious
, and quit business to enjoy it. Does not every such man find out his
ke?

orter. Yes, I went up to Connecticut last year and interviewed one
se very men. He had an earthly paradise, but the devil was in it
e shape of idleness, and the poor rich old man told me he was going
art an orphan asylum, and run it himself, just to have enough to do
ep him from going crazy or committing suicide.

. *H*. You have hit it exactly. Activity is a law of life. Idleness leads
gnation, and stagnation is death. Every man must be active. A
man wants to be all the time doing something useful, an evil man
s to be all the time doing something harmful. The old gentleman
you interviewed in Connecticut, being a good-hearted man, his
ressible craving for activity burst out in a charitable direction and he
ded an orphan asylum. If he had been a bad hearted man his activity
d have taken an evil direction. In the spiritual world every one has
ame passions and desires as here. The good spirits seek to be useful and
bad spirits seek to gratify their evil dispositions. The same laws
rn the coalescence of the inhabitants of the world of spirits into
ties or communities which govern the same thing here. In this world
icious seek out and consort with the vicious and the good consort with

the good. Take the people who arrive in this city, for example, on any given Saturday night and Sabbath morning from all parts of the country. They are here relieved from the conventional restraint which keeps them in order at home, and every one is free to gratify his appetites at his will. You understand such things, and very well know that many of those persons who, if at home on that Sabbath would go to church, and exhibit a deal of hypocritical piety, will go to the haunts of vice in this city, and scoff at all religion, and wallow in wickedness. Every one of them who loves the company of the vicious, will seek out vicious companions, and go where he will enjoy himself most. On the other hand, those who really love the Lord, and in their very hearts want to do the right thing wherever they are, will seek out some church on that Sabbath, or will in some way show out and act out the love for the LORD and his people which dominates their lives. So, when people arrive in the spiritual world where all conventional restraints are removed, every one acts out his real nature. The wicked gradually sort themselves out from the good, and gravitate by choice to the hells. A hell is simply a society in which wickedness holds entire sway, and the worse the wickedness the worse the hell.

***Reporter*. But how about the punishment for sin? Is not hell a place of torment? and if it is, why do even the wicked like to go there?**

***Mr. H.* Why do the wicked go from choice into the hells of this world, and voluntarily accept the loss, disgrace, ruin, disease, suffering, and death, which come of going there? People are the same in the world of spirits that they are here; that is to say, they are human beings. Suppose you and I were to be struck dead this moment, and pass into the spiritual world. You would be you, wouldn't you, and I would be I? We should have the same spiritual natures which we have now, you would like there what you like here; and it would be the same with me. If we really love GOD and our neighbour here and now, we should love GOD and our neighbour there and then. If we love what is pure and holy here we should love what is pure and holy there. But if we really in our hearts love self, and the world, and evil and wickedness here, we should love the same there, no matter what we may pretend to love here. And loving wickedness we should go among the wicked, because we should prefer to do so. And being among the wicked, we should, of course, have a wicked and unhappy time of it, and grow worse and worse, and become very devils, and be tormented by our own burning passions and by our fellow devils, and suffer unspeakable anguish; and yet we would prefer that devilish state to heaven, just as the human devils in this world prefer their horrible life surroundings to the society of good christians.**

***Reporter*. I understand how it must naturally be as you say; but still I do not see where the punishment which GOD inflicts on sinners for the sins they committed in this world comes in.**

Mr. H. The Lord does not punish people hereafter for deeds done in the body. "Sufficient unto the day is the evil thereof." In the LORD's dealings with His creatures there is no such thing as punishment, in the sense in which that word is generally used, but only philosophical consequences. If you take hold of hot iron, it burns you. The burning is not a punishment, arbitrarily inflicted, but only a natural consequence. If a man eats or drinks any thing poisonous or hurtful, the inevitable consequences follows, and his body is injured, or perhaps his life sacrificed. So, too, if a man commits sin, his soul is injured, as a spiritual consequence; and by continuing in sin, he comes to love it, and his soul gets such an appetite for it that he continues sinning in the world of spirits, and grows in wickedness, and finally goes to hell, as a spiritual consequence of his sins, just as a drunkard finally goes to a drunkard's grave not as a punishment arbitrarily imposed upon him for his offence, but as a physiological consequence of his excessive indulgence in strong drink.

Reporter. Do men go to heaven on the same principles?

Mr. H. Precisely. By cultivating during this life love to the LORD and to the neighbour, a good man, with the LORD'S help, acquires the habit of enjoying the exercise of his good affections and in the other life seeks the society of companions of a like character. It is easily seen that a community of people all loving and obeying the LORD, and all loving one another and trying to do the greatest possible good to one another, must make a heaven wherever they may be.

Reporter. What chance is there for doing good to your neighbours in heaven? Doesn't the LORD give your neighbours all they want there without your help?

Mr. H. He does not do it there any more than he does it here, you must remember that our happiness comes through the right use of the faculties which the LORD has bestowed on us. The LORD works by instrumentalities in heaven the same as he does here. For example, he gives us the relation between husband and wife, of parent and child, of teacher and scholar, to bring into activity and to gratify our deepest and tenderest affections, and it is only in this way—that is, by the exercise of our affections—that we can get any development.

Reporter. Do you mean to say that there are the relations of husbands and wives, parents and children, and teachers and scholars in heaven?

Mr. H. I do. Natural death has no power to effect a permanent separation between a husband and wife who have tenderly loved each other in the world and at the same time were grounded in sincere love to GOD. There are husbands and wives in heaven as there are on this earth; and though no children are born there yet the children who die in this world, and who all go to heaven have to be brought up and educated to adult age; so, too the ignorant good people among Christians and the good among the heathen, who all go to heaven, have to be instructed there. And in fact what do the wisest of us know in comparison with the angels who have been in heaven for thousands of years? As arrivals there are incessant, there is never any cessation of the work of instruction. Hence there is the exercise of the parental office, and the relation of teacher and scholar. Did it ever occur to you to imagine what has become of the myriads of infants that have died and gone into the world of spirits. Do you suppose that infants that died five thousand years ago are kept bottled up somewhere as infants still? Are all the infants that have died, and that are dying, and that will hereafter die, to be kept for ages upon ages in an infantine state, and then be finally judged as infants, and sent to their doom as infants, and kept as infants,—myriads of them not one hour old—throughout eternity? Do you suppose there is to be any such waste of immortal material as that? Is it not more reasonable to suppose that the LORD in the exercise of His infinite love and wisdom, has made provision for their care, and comfort, and instruction? It would be justly considered an act of atrocious cruelty to send countless infants off to some distant land, without making any provision for their welfare when they should arrive at their destination. And is there any reasonable religious being on earth who would dare to imagine that the LORD has not made ample provision for the welfare of all His little ones that go in their helplessness to the unseen land?

Reporter. All the mothers will be apt to accept your doctrine as to the fate of infants in the other life. It looks reasonable. But if Swedenborg's views are correct, it strikes me that a great many good Christians are foredoomed to disappointment, and will not find the heaven they longed for.

Mr. H. There you are mistaken. Swedenborg expressly says, that every good person, on his first arrival in the world of spirits, finds exactly the heaven he believes in.

Reporter. Why is that?

Mr. H. To take the nonsense out of him. When people imagine that heavenly happiness consists in endless worship, or singing, or sitting on beds of flowers, or roaming in paradisaical gardens, or feasting with the patriarchs, or merely getting into a place called heaven, they are allowed to try the experiment, till they become so disgusted that they wish to break away from such enjoyments, and escape to some place where they can find something useful to do. They are then instructed that heaven consists in performing uses—doing useful things—in the name of the LORD, and right glad are they to learn that lesson. The essence of heavenly delight is the doing of good to others, and not the selfish gratification of one's own desires. Swedenborg says that the angels not only love the neighbour as themselves, but better than themselves, and find ineffable delight in ministering to their neighbours. That is in accordance with the teaching of the LORD while on earth: "But he that is greatest among you shall be your servant." (Matt. xxiii. 11.

Reporter. But what do angels find to do in heaven ?

Mr. H. Every thing that good men and women do in a perfect state of society on earth, with of course such exceptions as grow out of the difference between the material and the spiritual worlds. Some are teachers of religious truth to new comers from this world. Some, particularly women, take care of infants and children. Immense numbers are engaged in watching over us who still live here in this world. "Are they not all ministering spirits sent forth to minister for them who shall be heirs of salvation," (Heb. i. 14), and as many, if not more, in ameliorating the miseries of the inmates of hell. It is there as it would be here in a community of good and benevolent people, each one does what he is best qualified for to promote the general welfare and happiness.

Reporter. Will people know each other there ?

Mr H. Yes, but if that knowledge is only of the outward seeming, as it often is in this world, and not of real interior character, it will soon pass away, because there everybody at length has to show his real character, no hypocrisy is possible there. Hence, unless people have an interior affinity for one another, they do not remain together in the spiritual world.

Reporter. Do you administer the usual ordinances ?

Mr. H. We administer the rite of Baptism, and the sacrament of the Holy Supper, and carry on our worship very much like other Christians. We are liberal in our notions as to other sects, and wish them all God speed. The fact is the New Jerusalem is coming down out of heaven in all parts of the world and in all denominations. It has transformed the theology and the preaching of Christendom within a century. Henry Ward Beecher preaches more of the essence of the new church doctrines than some of our own ministers. Bishop Clark of Rhode Island does the same. By the essence of our doctrines, I mean love to GOD and the neighbour carried out in actual life by keeping the commandments, both in their letter and their spirit.

To the foregoing, we add the following extracts from Swedenborg.

THE CRITERION FOR CHARACTER.—"Man may know which he is amongst, whether amongst the infernal spirits or the angelic. If he intends evil to his neighbor, thinking nothing but evil concerning him, and actually doing evil when in his power, and finding delight in it, he is amongst the infernals, and becomes himself also an infernal in the other life; but if he intends good to his neighbor, and thinks nothing but good concerning him, and actually does good when in his power, he is amongst the angelic, and becomes himself an angel in the other life." "Let a man search out the end which he regards in preference to all the rest, and in respect to which subordinate ends are as nothing; and if he regards self and the world as ends, be it known to him that his life is an infernal one; but if he regards as ends the good of his neighbor, the general good, the LORD's Kingdom, and especially the LORD Himself, be it known to him that his life is a heavenly one." "A man serious in his duty towards God and his neighbor, may always know whether he is on the right road to salvation or not, by examining himself and his own thoughts by the Ten Commandments; as, for instance, whether he loves and fears God; whether he is happy in seeing the welfare of others, and does not envy them; whether on having received a great injury from others, which may have excited him to anger and to meditate revenge, he afterwards changes his sentiments, because GOD has said that vengence belongs to him, and so on; then he may rest assured, that he is on the way to heaven, but when he discovers himself to be actuated by contrary sentiments, on the road to hell."

CONCERNING AGE IN HEAVEN.—Those who are in heaven are continually advancing to the spring of life, and the more thousands of years they live to a spring so much the more delightful and happy, and this to eternity, with increments according to the progresses and degrees of love, charity, and of faith. Of the female sex, those who have died old and worn out with age, and have lived in charity towards their neighbor, and in happy conjugal love with a husband, after a succession of years come more and more into the flower of youth and adolescence, and into a beauty which exceeds every idea of beauty ever perceivable by the sight. Good-

and charity is what forms and makes a resemblance of itself, and
es the delightful and beautiful of charity to shine forth from the
ntest parts of the face, so that they themselves are forms of charity.
have been seen by some, and have excited astonishment. The form
arity, which is seen to the life in heaven, is such that charity itself is
effigies and is effigied, and this in such a manner, that the whole
l, especially the face, is as it were charity, which manifestly both
ars, and is perceived, which form, when it is beheld, is ineffable
ty, affecting with charity the very inmost of the mind. In a word, to
old in heaven is to grow young; those who have lived in love to the
D and in charity towards their neighbor, become such forms, or such
ties, in the other life. *Heaven and Hell.* 414.

ATE OF THE WORLD AND CHURCH, AFTER, AND IN CONSEQUENCE
HE LAST JUDGMENT.—"The *state* of the WORLD hereafter will be quite
lar to what it has been heretofore, for the great change, which has been
ted in the spiritual world, does not induce any change in the natural
d as regards the outward form; so that the affairs of states, peace,
ties and wars, with all other things which belong to the societies of
, in general and in particular, will exist in the future, just as they ex-
in the past. The LORD's saying that in the last times there will be
, and that nation will rise up against nation, and kingdom against
dom, and that there will be famines, pestilences and earthquakes in
rs places," Matt. XXIV. 6, 7, does not signify that such things will
t in the natural world, but that things correspondent with them will
t in the spiritual world, for the Word in its prophecies does not treat
e kingdoms, or of the nations upon earth, or consequently of their
s, or of famines, pestilences, and earthquakes in nature, but of such
gs as correspond to them in the spiritual world, what these things
is explained in the ARCANA CŒLESTIA. But as for the STATE OF THE
RCH, this it is which will be dissimilar hereafter; *it will be similar* in-
in the *outward* form, *but dissimilar in the inward*. To outward appear-
divided churches will exist as heretofore, their doctrines will be taught
eretofore; and the same religions as now will exist among the Gentiles.
henceforward the man of the church will be in a more free state of
king on matters of faith, that is, on spiritual things which relate
heaven, *because spiritual liberty has been restored to him.*
all things in the heavens and in the hells are now reduced into
r, and all things which entertains or opposes divine things inflows
thence—, from the heavens, all which is in harmony with divine
gs, and from the hells, all which is opposed to them. But man does
observe this change of state in himself, because he does not reflect
it, and because he knows nothing of spiritual liberty, or of influx;
rtheless it is perceived in heaven, and also by man himself when he
. Since spiritual liberty has been restored to man, the spiritual sense
he WORD is now unveiled, and interior Divine Truths are revealed by
ns of it; for man in his former state would not have received them,
he who would have understood them would have profaned them."
ence it is that after the last judgment, and not sooner, revelations were
le for the New Church. For since communication has been restored
he last Judgment, man is able to be enlightened and reformed, that is,
nderstand the Divine Truth of the WORD, to receive it when under-
d, and to retain it when received, for the interposing obstacles are
oved; and therefore John, after the former heaven and the former
h passed away, said that he saw a new heaven and a new earth, and
, the holy city new Jerusalem coming down from GOD out of heaven
pared as a bride adorned for her husband; and heard One sitting upon
throne say, Behold I make all things new." Rev. XXI. 1, 2, 5.
e above was written by Swedenborg in 1758, or 115 years ago. The
judgment foretold in Matt. XXIV, Luke XXI. 9, 27, Rev. VI. 12, 17.
. 18, and other places, was fully accomplished in the spiritual world,
described by him), by the end of the year 1757, or the year previous to
one first mentioned, and I appeal to every enlightened mind if the
ve statements regarding the condition of the world, and the
e of the man of church have not been verified by actual histori-
facts, which even at this day, 1878, have assumed an amplitude which

it would require a volume to describe. The last judgment was executed on such of the wicked as had passed into the spiritual world from the LORD's time until the year 1757, but not upon those who lived previous, for a last judgment had twice before existed on the earth, the first was executed upon the posterity of the Most Ancient church, and is described in the Word by the flood; the other was effected by the LORD Himself when he was in the world, as it is written, "Now is the judgment of this world, now is the prince of this world cast out," John XII. 31. It is of Divine order that a judgment takes place at the end of a church, when ignorance of God, the falsification of His Word, and consequent dreadful wickedness has arisen to such a height that, for the sake of the good, judgment can no longer be restrained. With these facts before us, we can now perceive the infernal origin of that malignant spirit which held supreme sway during the dark ages down to the date in question, and vented itself in murdering, burning, racking, and persecuting millions of innocent human beings in the name of religion. To this period may be assigned the sublime descriptive imagery of the prophet, when he says, "Behold, darkness shall cover the earth, and gross darkness the people," of which we will only say that we have had the darkness with a most terrible verity, for even now the man of the church is but slowly emerging out of it. True order requires that man must divest himself of error and falsities before he can receive truths, and all experience shows that this can only be effected gradually, and little by little, as the understanding becomes enlightened, for the will principle must be convinced from, or by, the understanding, and this in perfect freedom. It can never be forced.

By the holy city New Jerusalem, which was seen coming down from God out of heaven, mentioned in Rev. xxi., and described in the internal sense of the Word, in Isa. lii. 1, 2, 6, 9, lx, 1, 22, lxii., 1, 12, lxv., 17, 22, lxvi., 22. Dan vii., 13, 14, is not meant a city, for it is described as being of pure gold, as being square, twelve thousand furlongs, or about 1500 English miles, each way, and the *height* the same, such a city could not exist on the earth, and is not to be so understood. By a city in the Word, is signified the Church as to doctrine, as when we pray for the peace of Jerusalem, we mean the Church, signified by Jerusalem, and not the city of that name in Palestine, so by the new Jerusalem, and its description by correspondences and symbols, in Rev. xxi., we are not to understand any city, but the nature and quality of a church, or New Dispensation of Divine Truth, drawn from the Word, which would be unfolded to the world after the last judgment had taken place. Every particular of this description involves a spiritual sense which precludes any error from entering into the interpretation. For instance, it is written, "And the twelve gates were twelve pearls; every several gate was of one pearl," v. 21, by which is signified the great and glorious truth that the acknowledgment and knowledge of the LORD conjoins into one all the knowledges of truth and good derived from the Word. That the LORD is the very gate by which to enter the Church and heaven, He Himself teaches when He says, "I am the door; by me if any man enter in, he shall be saved, " John x. 9. This is also meant where it is written, "Open ye the gates, that the righteous nation which keepeth the truth may enter in," Isa. xxvi., 2. The LORD further says, "The kingdom of heaven is like unto a merchant man, seeking goodly pearls; who, when he had found ONE PEARL OF GREAT PRICE, went and sold all that he had, and bought it," Matt. xiii., 45, 46. The one pearl of great price, signifies the knowledge and acknowledgment of the LORD; to sell all that he had and buy it, signifies for man to divest himself of error and falsity, and receive this great truth. A rock, stones, precious stones, and pearls, are used in the Word as corresponding symbols of truth, hence the LORD as to the principle of His Divine Truth, is called the Rock, Deut., xxxii. Ps xcv., 1., and many other places, the "stone of Israel" Gen. xlix., 24. "a stone, a tried stone, a precious corner stone, a sure foundation," Isa. xxviii., 16. The king of Tyre in Ezekiel, represents the man of the Church as to knowledges, hence it is written of him, "Thou has been in Eden, the garden of GOD; every precious stone was thy covering, the sardius, topaz, and the diamond, the beryl, the onyx, and the jasper, the sapphire, the emerald, and the carbuncle, and gold" xxviii., 13. It is plain that these expressions are not to be literally understood, but are thus expressed for the sake of the spiritual sense, in which precious stones signify truths. The like is meant by "Eden, the garden of God" in which the king of Tyre is said to have been, which is used in the Word to denote intelligence, and wisdom thence derived. The garden of Eden was as much unknown in the time of the king of Tyre as it is at this day, such a locality as that described in Gen. ii., 8, 14, having no geographical existence on the globe; hence the vain researches, travels, expeditions, writings, &c,, of the curious and the learned, during the past and present ages, regarding this subject, they being ignorant that the whole account is to be understood as a pure allegory, descriptive of the state of the men of the Most Ancient Church. This was the universal style of writing among these people, it was derived from a heavenly origin, and they delighted in framing descriptions of this kind, expressing spiritual truths by means of allegories or correspondences, making use of natural objects to symbolize spiritual truths. It must be visible to every one, that when the trees of the garden are described natural trees are not to be understood, for life, and the knowledge of good and evil, do not grow on such trees, and so on with other things. This style of writing is continued to about the end of the eleventh chapter of Genesis, where literal or true history begins, but still of such a nature that it involves a spiritual sense throughout. As mankind receded from a heavenly state, and became corporeal and sensual, believing in nothing which they could not investigate with their bodily senses, the knowledge of correspondences became gradually lost, and remained so, until under the Divine Providence of the Lord it has been again restored to the Church, and made available to unfold the true meaning of the Word. So now those who have hitherto "walked in darkness" may "see a great light," and the Church may be addressed in the sublime language of the prophet, "ARISE, SHINE; FOR THY LIGHT IS COME, AND THE GLORY OF THE LORD IS RISEN UPON THEE."

SUMMARY STATEMENT OF THE DOCTRINES OF THE NEW CHURCH.

I. God is One in Essence and in Person, in whom there is a distinct and essential Trinity, called in the Word the Father, Son, and Holy Spirit, and the Lord Jesus Christ is this God, and the only true object of worship.

II.—In order to be saved, man must believe on the Lord, and strive to obey his commandments, looking to Him alone for strength and assistance, and acknowledging that all life and salvation are from Him.

III.—The Sacred Scriptures, or the Divine Word, is not only the Revelation of the Lord's will and the history of his dealings with men, but also contains the infinite treasures of his wisdom expressed in symbolical or correspondential language, and therefore in addition to the sense of the letter, there is in the Word an inner or spiritual sense, which can be interpreted only by the law of correspondence between things natural and things spiritual.

IV.—Now is the time of the Second Coming of the Lord, foretold in Matt. xxiv., and the establishment of the New Church signified by the New Jerusalem in Revelation xxi., and this Second Coming is not a visible appearance on earth, but a new disclosure of Divine Truth and the promulgation of true Christian Doctrine, effected by means of the Lord's servant, Emanuel Swedenborg, who was specially instructed in this Doctrine, and commissioned to publish it to the world.

V.—Man's life in the material body is but the preparation for eternal life, and when the body dies man immediately rises into the spiritual world, and, after preparation in an intermediate state, dwells for ever in Heaven or Hell, according to the character acquired during his earthly life.

VI.—The Spiritual World, the eternal home of men after death, is not remote from this world, but is in direct conjunction with it, and we are, though unconsciously, always in immediate communion with angels and spirits.

NEW CHURCH BOOKS AND PAMPHLETS FOR SALE

by James Spiers, 36 Bloomsbury St. London W. C. England, E. H. Swinney, 20 Cooper Union, New York City, U. S. A.; Carter & Pettee, 3Beacon St. Boston, Mass. U. S. A. In the following list the postage is included, unless otherwise specified. The prices in England vary from the following, which have reference to American money only.

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INTEREST TABLE,

AT SIX PER CENT., IN DOLLARS AND CENTS, FROM ONE DOLLAR TO TEN THOUSAND.

	1 day.	7 days.	15 days.	1 mo.	3 mos.	6 mos.	2 mos.
$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	00	00	00¼	00½	01½	03	06
2	00	00¼	00½	01	03	06	12
3	00	00¼	00¾	01½	04½	09	18
4	00	00½	01	02	06	12	24
5	00	00½	01¼	02½	07½	15	30
6	00	00¾	01½	03	09	18	36
7	00	00¾	01¾	03½	10½	21	42
8	00	01	02	04	12	24	48
9	00	01	02¼	04½	13½	27	54
10	00	01¼	02½	05	15	30	60
20	00⅓	02⅓	05	10	30	60	1 20
30	00½	03½	07½	15	45	90	1 80
40	00⅔	04⅔	10	20	60	1 20	2 40
50	01	06	12½	25	75	1 50	3 00
100	01⅔	11⅔	25	50	1 50	3 00	6 00
200	03	23⅓	50	1 00	3 00	6 00	12 00
300	05	35	75	1 50	4 50	9 00	18 00
400	07	46⅔	1 00	2 00	6 00	12 00	24 00
500	08	58⅓	1 25	2 50	7 50	15 00	30 00
1000	17	1 16⅔	2 50	5 00	15 00	30 00	60 00
2000	33	2 33⅓	5 00	10 00	30 00	60 00	120 00
3000	50	3 50	7 50	15 00	45 00	90 00	180 00
4000	67	4 66⅔	10 00	20 00	60 00	120 00	240 00
5000	83	5 83⅓	12 50	25 00	75 00	150 00	300 00
10000	1 67	11 66⅔	25 00	50 00	150 00	300 00	600 00

AT SEVEN PER CENT., IN DOLLARS AND CENTS, FROM ONE DOLLAR TO TEN THOUSAND.

1	00	00	00¼	00½	01¾	03½	07
2	00	00¼	00½	01¼	03½	07	14
3	00	00¼	00¾	01¾	05¼	10½	21
4	00	00½	01	02⅓	07	14	28
5	00	00¾	01¼	03	08¾	17½	35
6	00	00¾	01¾	03½	10½	21	42
7	00	01	02	04	12¼	24½	49
8	00	01	02¼	04⅔	14	28	56
9	00	01¼	02½	05¼	15¾	31½	63
10	00¼	01¼	03	05¾	17½	35	70
20	00⅓	02¾	06	11⅔	35	70	1 40
30	00½	04	09	17½	52½	1 05	2 10
40	00¾	05½	12	23⅓	70	1 40	2 80
50	01	06¾	15	29¼	87½	1 75	3 50
100	02	13½	29	58⅓	1 75	3 50	7 00
200	04	27¼	58	1 16⅔	3 50	7 00	14 00
300	06	40¾	87½	1 75	5 25	10 50	21 00
400	08	54½	1 17	2 33⅓	7 00	14 00	28 00
500	10	68	1 46	2 91⅔	8 75	17 50	35 00
1000	19½	1 36	2 92	5 83⅓	17 50	35 00	70 00
2000	39	2 72¼	5 83	11 66⅔	35 00	70 00	140 00
3000	58	4 08¼	8 75	17 50	52 50	105 00	210 00
4000	78	5 44½	11 67	23 33⅓	70 00	140 00	280 00
5000	97	6 80½	14 58	29 16⅔	87 50	175 00	350 00
10000	1 94	13 61	29 17	58 33	175 00	350 00	700 00

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Lbs	cts .25	cts .50	$ ct 1.00	$ ct 2.00	$ ct 3.00	$ ct 5.00	$ ct 6.00	$ cts 7.00	$ cts 8.00	$ cts 9.00	$ cts 10.00	$ cts 11.00	$ cts 12.00
3	..	..	..	..	..	. 1	. 1	. 1	. 1	. 1	. 2	. 2	. 2
7	..	..	..	. 1	. 1	. 2	. 2	. 2	. 3	. 3	. 4	. 4	. 4
10	..	..	. 1	. 1	. 2	. 3	. 3	. 4	. 4	. 5	. 5	. 6	. 6
20	..	. 1	. 1	. 2	. 3	. 5	. 6	. 7	. 8	. 9	.10	.11	.12
30	..	. 1	. 2	. 3	. 5	. 8	. 9	.11	.12	.14	.15	.17	.18
50	. 1	. 1	. 3	. 5	. 8	.13	.15	.18	.20	.23	.25	.28	.30
70	. 1	. 2	. 4	. 7	.11	.18	.21	.25	.28	.32	.35	.39	.44
80	. 1	. 2	. 4	. 8	.12	.20	.24	.28	.32	.36	.40	.44	.48
90	. 1	. 2	. 5	. 9	.14	.23	.27	.32	.36	.41	.45	.50	.52
100	. 1	. 3	. 5	.10	.15	.25	.30	.35	.40	.45	.50	.55	.60
200	. 3	. 5	.10	.20	.30	.50	.60	.70	.80	.90	1.00	1.10	1.20
300	. 4	. 8	.15	.30	.45	.75	.90	1.05	1.20	1.35	1.50	1.65	1.80
400	. 5	.10	.20	.40	.60	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40
500	. 6	.13	.25	.50	.75	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
600	. 8	.15	.30	.60	.90	1.50	1.80	2.10	2.40	2.70	3.00	3.60	3.60
700	. 9	.18	.35	.70	1.05	1.75	2.10	2.45	2.80	3.15	3.50	3.85	4.20
800	.10	.20	.40	.80	1.20	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80
900	.11	.23	.45	.90	1.35	2.25	2.70	3.15	3.60	4.05	4.50	4.95	5.40
1000	.13	.25	.50	1.00	1.50	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
1100	.14	.28	.55	1.10	1.65	2.75	3 30	3.85	4.40	4.95	5.50	6.05	6.60
1200	.15	.30	.60	1.20	1.80	3.00	3.60	4.20	4.80	5.40	6.00	6.60	7.20
1300	.16	.33	.65	1.30	1.95	3.25	3.90	4.55	5.20	5.85	6.50	7.15	7.80
1400	.18	.35	.70	1.40	2.10	3.50	4.20	4.90	5.60	6.30	7.00	7.70	8.40
1500	.19	.38	.75	1.50	2.25	3.75	4.50	5.25	6.00	6.75	7.50	8.25	9.00
1600	.20	.40	.80	1.60	2.40	4.00	4.80	5.60	6.40	7.20	8.00	8.80	9.60
1700	.21	.43	.85	1.70	2.55	4.25	5.10	5.95	6.80	7.65	8.50	9.35	10.20
1800	.23	.45	.90	1.80	2.70	4.50	5.40	6.30	7.20	8.10	9.00	9.90	10.80
1900	.24	.48	.95	1.90	2.85	4.75	5.70	6.65	7.60	6.55	9.50	10.45	11.40

Lbs	$ cts 13.00	$ cts 14.00	$ cts 15.00	$ cts 16.00	$ cts 17.00	$ cts 19.00	$ cts 20.00	$ cts 25.00	$ cts 40.00	$ cts 50.00
3	. 2	. 2	. 2	. 2	. 3	. 3	. 3	. 4	. 6	. 8
7	. 5	. 5	. 5	. 6	. 6	. 7	. 7	. 9	.14	.18
10	. 7	. 7	. 8	. 8	. 9	.10	.10	.13	.20	.25
20	.13	.14	.15	.16	.17	.19	.20	.25	.40	.50
30	.20	.21	.23	.24	.26	.29	.30	.38	.60	.75
50	.33	.35	.38	.40	.43	.48	.50	.63	1.00	1.25
70	.46	.49	.53	.56	.60	.67	.70	.88	1.40	1.75
80	.52	.56	.60	.64	.68	.76	.80	1.00	1.60	2.00
90	.59	.63	.68	.72	.77	.86	.90	1.13	1.80	2.25
100	.65	.70	.75	.80	.85	.95	1.00	1.25	2.00	2.50
200	1.30	1.40	1.50	1.60	1.70	1.90	2.00	2.50	4.00	5.00
300	1.95	2.10	2.25	2.40	2.55	2.85	3.00	3.75	6.00	7.50
400	2.60	2.80	3.00	3.20	3.40	3.80	4.00	5.00	8.00	10.00
500	3.25	3.50	3.75	4.00	4.25	4.75	5.00	6.25	10.00	12.50
600	3.90	4.20	4.50	4.80	5.10	5.70	6.00	7.50	12.00	15.00
700	4.55	4.90	5.25	5.60	5.95	6.65	7.00	8.75	14.00	17.50
800	5.20	5.60	6.00	6.40	6.80	7.60	8.00	10.00	16.00	20.00
900	5.85	6.30	6.75	7.20	7.65	8.55	9.00	11.25	18.00	22.50
1000	6.50	7.00	7.50	8.00	8.50	9.50	10.00	12.50	20.00	25.00
1100	7.15	7.70	8.25	8.80	9.35	10.45	11.00	13.75	22.00	27.50
1200	7.80	8.40	9.00	9.60	10.20	11.40	12.00	15.00	24.00	30.00
1300	8.45	9.10	9.75	10.40	11.05	12.35	13.00	16.25	26.00	32.50
1400	9.10	9.80	10.50	11.20	11.90	13.30	14.00	17.50	28.00	35.00
1500	9.75	10.50	11.25	12.00	12.75	14.25	15.00	18.75	30.00	37.50
1600	10.40	11.20	12.00	12.80	13.60	15.20	16.00	20.00	32.00	40.00
1700	11.05	11.90	12.75	13.60	14.15	16.15	17.00	21.25	34.00	42.50
1800	11.70	12.60	13.50	14.40	15.30	17.10	18.00	22.50	36.00	45.00
1900	12.35	13.30	14.25	15.20	16.15	18.05	19.00	23.75	38.00	47.50

READY RECKONER, 2,240 LBS. TO THE TON.

If the No. required is not in the tables, add the amounts of two numbers together.

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Lbs	cts .25	cts .50	$ ct 1.00	$ ct 2.00	$ ct 3.00	$ ct 5.00	$ ct 6.00	$ cts 7.00	$ cts 8.00	$ cts 9.00	$ cts 10.00	$ cts 11.00	$ cts 12.00
20	..	..	..	. 2	. 3	. 4	. 5	. 6	. 7	. 8	. 9	.10	.11
25	..	..	. 1	. 2	. 3	. 5	. 7	. 8	. 9	.10	.11	.12	.13
30	..	..	. 1	. 3	. 4	. 7	. 8	. 9	.11	.12	.13	.15	.16
50	..	. 1	. 2	. 4	. 6	.11	.13	.16	.18	.20	.22	.25	.27
70	..	. 2	. 3	. 6	. 9	.15	.19	.22	.25	.28	.31	.34	.37
80	..	. 2	. 4	. 7	.11	.18	.21	.25	.29	.32	.36	.39	.43
90	..	. 2	. 4	. 8	.12	.20	.24	.28	.32	.36	.40	.44	.48
100	. 1	. 2	. 4	. 9	.13	.22	.27	.31	.36	.40	.45	.49	.54
200	. 2	. 4	. 9	.18	.27	.45	.54	.63	.71	.80	.89	.98	1.07
300	. 3	. 7	.13	.27	.40	.67	.80	.94	1.07	1.21	1.34	1.47	1.61
400	. 4	. 9	.18	.36	.54	.89	1.07	1.25	1.43	1.61	1.79	1.96	2.14
500	. 6	.11	.22	.45	.67	1.12	1.34	1.56	1.79	2.01	2 23	2.46	2.68
600	. 7	.13	.27	.54	.80	1 34	1.61	1.88	2.14	2.41	2.68	2.95	3.21
700	. 8	.16	.31	.63	.94	1.56	1.87	2.19	2.50	2.81	3.12	3 44	3.75
800	. 9	.18	.36	.71	1.07	1.79	2.14	2.50	2.86	3.21	3.57	3.93	4.29
900	.10	.20	.40	.80	1.21	2.01	2.41	2.81	3.21	3.62	4.02	4.42	4.82
1000	.11	.22	.45	.89	1.34	2.23	2.68	3.13	3.57	4.02	4.46	4.91	5.36
1100	.12	.25	.49	.98	1.47	2.46	2.95	3.44	3.93	4.42	4.91	5.40	5.89
1200	.13	.27	.54	1.07	1.61	2.68	3.21	3.75	4.29	4.82	5.36	5.89	6.43
1300	.14	.29	.58	1.16	1.74	2.90	3.48	4.06	4.64	5.22	5.80	6.38	6.96
1400	.16	.31	.62	1.25	1.87	3.12	3.75	4.38	5.00	5.62	6.25	6.87	7.50
1500	.17	.33	.67	1.34	2.01	3.55	4.02	4.69	5.36	6.03	6.70	7.37	8.04
1600	.18	.36	.71	1.43	2.14	3.57	4.28	5.00	5.71	6.43	7.14	7.86	8 57
1700	.19	.38	.76	1.52	2.28	3.79	4.56	5.31	6.07	6.83	7.59	8.35	9.11
1800	.20	.40	.80	1.61	2.41	4.02	4.82	5.63	6.43	7.23	8.04	8.84	9.64
1900	.21	.42	.85	1.70	2.54	4.24	5.09	5.94	6.78	7.63	8.48	9.33	10.18
2000	.22	.45	.89	1.78	2.68	4.46	5.36	6.25	7.14	8.03	8.93	9.82	10.71
2100	.23	.47	.94	1.87	2.81	4.69	5.62	6.56	7.50	8.44	9.37	10 31	11.25

Lbs	$ cts 13.00	$ cts 14.00	$ cts 15.00	$ cts 16.00	$ cts 17.00	$ cts 19.00	$ cts 20.00	$ cts 21.00	$ cts 23.00	$ cts 24.00
20	.12	.13	.13	.14	.15	.17	.18	.19	.21	.21
25	.15	.16	.17	.18	.19	.21	.22	.23	.26	.27
30	.17	.19	.20	.21	.23	.25	.27	.28	.31	.32
50	.29	.31	.33	.36	.38	.42	.45	.47	.51	.54
70	.41	.44	.47	.50	.53	.59	.62	.66	.72	.75
80	.46	.50	.54	.57	.61	.68	.71	.75	.82	.86
90	.52	.56	.60	.64	.68	.76	.80	.84	.92	.96
100	.58	.63	.67	.71	.76	.85	.89	.94	1.03	1.07
200	1.16	1.25	1.34	1 42	1.52	1.70	1.79	1.88	2.05	2.14
300	1.74	1.88	2.01	2.14	2.28	2.54	2.68	2.81	3.08	3.21
400	2.32	2.50	2.68	2.86	3.04	3.39	3.57	3.75	4.11	4.29
500	2.90	3.13	3.35	3.57	3.79	4.24	4.46	4.69	5.13	5.36
600	3.48	3.75	4.02	4.29	4.55	5.09	5.36	5.63	6.16	6.43
700	4.06	4.38	4.69	5.00	5.31	5.94	6.25	6.56	7.19	7.50
800	4.64	5.00	5.36	5.71	6.07	6.79	7.14	7.50	8.21	8.57
900	5.22	5.63	6.03	6.43	6.83	7.63	8.04	8.44	9.24	9.64
1000	5.80	6.25	6.70	7.14	7.59	8.48	8.93	9.38	10.27	10.71
1100	6.38	6.88	7.37	7.86	8.35	9.33	9.82	10 31	11.29	11.79
1200	6.96	7.50	8.04	8.57	9.11	10.18	10.71	11.25	12.32	12.86
1300	7.54	8.13	8.70	9.28	9.87	11.03	11.61	12.19	13.35	13.93
1400	8.12	8.75	9.37	10.00	10.62	11.87	12.50	13.13	14.37	15.00
1500	8.70	9.38	10.04	10.71	11.38	12.72	13.39	14.06	15.40	16.07
1600	9.28	10.00	10.71	11.43	12.14	13.57	14.28	15.00	16.43	17.14
1700	9.86	10.63	11.38	12.14	12.90	14.42	15.18	15.94	17.45	18.21
1800	10.44	11.25	12.05	12.86	13.66	15.27	16.07	16.88	18.48	19.29
1900	11.03	11.88	12.72	13.57	14.42	16.12	16 96	17.81	19.51	20.36
2000	11.61	12.50	13.39	14.28	15.18	16.96	17.36	18.75	20.53	21.43
2100	12.19	12.13	14.06	15.00	15.94	17.81	18.75	19.69	21.56	22.50

READY RECKONER, 2,240 LBS. TO THE TON.

If the article cost $12.50 per ton, add the amounts under $12.00 and 50 cts. together.

Lbs	$ cts 25 00	$ cts 26 00	$ cts 27 00	$ cts 29 00	$ cts 30 00	$ cts 31 00	$ cts 33 00	$ cts 34 00	$ cts 35 00	$ cts 36 00
20	.22	.23	.24	.26	.27	.28	.29	30	31	.32
25	.28	.29	.30	.32	.33	.35	.37	.38	.39	.40
30	.33	.35	36	.39	.40	.41	.44	.46	.47	.48
50	.56	.58	.60	.65	.67	.69	.74	.76	.78	80
70	.78	.81	.84	.91	.94	.97	1.03	1 06	1.09	1.12
80	.89	.93	.96	1.04	1.07	1.11	1 18	1.21	1 25	1 29
90	1.00	1.04	1.08	1.16	1.21	1.25	1.33	1.37	1.41	1.45
100	1.12	1.16	1.21	1.29	1 34	1.38	1.47	1.52	1 56	1 61
200	2.23	2 32	2 41	2.59	2 68	2.77	2.94	3 04	3 12	3 21
300	3 35	3 48	3.62	3.88	4.02	4.15	4.41	4 55	4.69	4 82
400	4.46	4 64	4.82	5.18	5.36	5.54	5.89	6.07	6 25	6.43
500	5.58	5.80	6.03	6.47	6.70	6.92	7.37	7 59	7 81	8 04
600	6.70	6.96	7.28	7.77	8.04	8.30	8.84	9 11	9.38	9 64
700	7.81	8.12	8.44	9.06	9.37	9.69	10.31	10.62	10.94	11 25
800	8.93	9 29	9.64	10.36	10.71	11.07	11.79	12.14	12.50	12 86
900	10.04	10.45	10.85	11.65	12.05	12.46	13.26	13.66	14.06	14.46
1000	11.16	11.61	12.05	12.95	13.39	13.84	14.73	15 18	15.63	16.07
1100	12.28	12 77	13.26	14.24	14.73	15 22	16.21	16.70	17 19	17 68
1200	13.39	13 93	14.46	15.54	16.07	16.61	17 68	18 21	18.75	19 29
1300	14.51	15.09	15.67	16.83	17.41	17.99	19.15	19 73	20.31	20.89
1400	15.62	16.25	16.87	18.12	18.75	19.37	20.62	21 25	21.88	22.50
1500	16.74	17.41	18.08	19.42	20.09	20.76	22.10	22 77	23 44	24 11
1600	17 86	18.57	19.28	20.71	21.43	22.14	23.57	24.28	25.00	25 71
1700	18.97	19.78	20.49	22.00	22.77	23.53	25.04	25.80	26.56	27.32
1800	20.09	20.89	21.70	23.30	24.11	24.91	26.52	27 32	28.13	28.93
1900	21 20	22.05	22.90	24.60	25.44	26.29	27.99	28.84	29.69	30.53
2000	22.32	23.21	24.10	25.89	26 78	27.67	29 46	30.36	31 25	32.14
2100	23.44	24.37	25.31	27.19	28.12	29.06	30.93	31.87	32.81	33.75

Lbs	$ cts 37 00	$ cts 39 00	$ cts 40 00	$ cts 41 00	$ cts 43 00	$ cts 44 00	$ cts 45 00	$ cts 50 00	$ cts 55 00	$ cts 60 00
20	.33	.35	36	.37	.38	.39	.40	.45	49	54
25	41	.44	.45	.46	48	.49	.50	.56	.61	67
30	.50	.52	54	55	57	.59	60	67	.74	.80
50	.83	87	.89	.92	.96	.98	1 00	1 12	1.23	1.34
70	1.16	1.21	1 25	1.28	1.34	1 37	1.41	1.56	1.72	1 87
80	1.32	1.39	1.43	1.46	1.54	1.57	1 61	1 79	1 96	2.14
90	1.49	1.57	1.61	1.65	1.73	1.77	1.81	2 01	2 21	2.41
100	1 65	1 74	1.79	1.83	1.92	1.96	2.01	2.23	2 46	2 68
200	3 30	3 48	3.57	3 66	3.84	3 93	4 02	4.46	4.91	5 36
300	4.96	5.22	5.36	5.49	5.76	5.89	6 03	6.70	7 37	8 04
400	6 61	6 96	7 14	7.32	7.68	7 86	8.04	8.93	9 82	10.71
500	8 26	8.71	8.93	9 15	9.60	9.82	10.04	11 16	12 28	13.39
600	9 91	10.45	10.71	10.98	11.52	11.79	12.05	13.39	14.73	16 07
700	11.56	12.19	12.50	12.81	13.44	13.75	14.06	15 62	17 19	18 75
800	13.21	13.93	14.29	14.64	15.36	15.71	16.07	17.86	19.64	21.43
900	14.87	15.67	16.07	16 47	17 28	17.68	18 08	20 09	22 10	24.11
1000	16.52	17.41	17 86	18.30	19.20	19 64	20.09	22.32	24 55	26.79
1100	18.17	19 15	19.64	20.13	21.12	21 61	22.10	24.55	27 01	29 46
1200	19.82	20.89	21.43	21.96	23 04	23.57	24 11	26.79	29.46	32 14
1300	21.47	22 63	23.21	23 79	24.95	25 58	26 12	29 02	31 92	34 82
1400	23.12	24.37	25 00	25 62	26.87	27 50	28 12	31 25	34 37	37.50
1500	24 78	26 12	26.79	27.45	28.79	29.46	30 13	33 48	36 83	40.18
1600	26 43	27.86	28.57	29.28	30.71	31.43	32 14	35.71	39 28	42.86
1700	28.08	29.60	30.36	31.12	32.63	33.39	34 15	37 95	41 74	45.53
1800	29.73	31.34	32.14	32.95	34.55	35.36	36.16	40 18	44 20	48 21
1900	31.38	33.08	33.93	34.78	36.47	37.32	38.17	42.41	46.65	50.89
2000	33.03	34.82	35.71	36.61	38.39	39.28	40.18	44.64	49.11	53 57
2100	34.68	36.56	37.50	38.44	40 31	41.25	42.19	46.87	51.56	56 25

READY RECKONER, to find the Price of any Number of Pounds, Yards, Pieces, or Bushels, from 2 cents to $3.00.

The first column contains the NUMBER, the top columns the PRICES.

Nos	2 ct.	3 ct.	4 ct.	5 ct.	6 ct.	6¼ ct.	7 ct.	8 ct.	9 ct.	10 ct.	11 ct.
2	.4	.6	.8	.10	.12	.12½	.14	.16	.18	.20	.22
3	.6	.9	.12	.15	.18	.18¾	.21	.24	.27	.30	.33
4	.8	.12	.16	.20	.24	.25	.28	.32	.36	.40	.44
5	.10	.15	.20	.25	.30	.31¼	.35	.40	.45	.50	.55
6	.12	.18	.24	.30	.36	.37½	.42	.48	.54	.60	.66
7	.14	.21	.28	.35	.42	.43¾	.49	.56	.63	.70	.77
8	.16	.24	.32	.40	.48	.50	.56	.64	.72	.80	.88
9	.18	.27	.36	.45	.54	.56¼	.63	.72	.81	.90	.99
10	.20	.30	.40	.50	.60	.62½	.70	.80	.90	1.00	1.10
11	.22	.33	.44	.55	.66	.68¾	.77	.88	.99	1.10	1.21
12	.24	.36	.48	.60	.72	.75	.84	.96	1.08	1.20	1.32
13	.26	.39	.52	.65	.78	.81¼	.91	1.04	1.17	1.30	1.43
14	.28	.42	.56	.70	.84	.87½	.98	1.12	1.26	1.40	1.54
15	.30	.45	.60	.75	.90	.93¾	1.05	1.20	1.35	1.50	1.65
16	.32	.48	.64	.80	.96	1.00	1.12	1.28	1.44	1.60	1.76
17	.34	.51	.68	.85	1.02	1.06¼	1.19	1.36	1.53	1.70	1.87
18	.36	.54	.72	.90	1.08	1.12½	1.26	1.44	1.62	1.80	1.98
19	.38	.57	.76	.95	1.14	1.18¾	1.33	1.52	1.71	1.90	2.09
20	.40	.60	.80	1.00	1.20	1.25	1.40	1.60	1.80	2.00	2.20
25	.50	.75	1.00	1.25	1.50	1.56¼	1.75	2.00	2.25	2.50	2.75
30	.60	.90	1.20	1.50	1.80	1.87½	2.10	2.40	2.70	3.00	3.30
40	.80	1.20	1.60	2.00	2.40	2.50	2.80	3.20	3.60	4.00	4.40
50	1.00	1.50	2.00	2.50	3.00	3.12½	3.50	4.00	4.50	5.00	5.50
60	1.20	1.80	2.40	3.00	3.60	3.75	4.20	4.80	5.40	6.00	6.60
70	1.40	2.10	2.80	3.50	4.20	4.37½	4.90	5.60	6.30	7.00	7.70
80	1.60	2.40	3.20	4.00	4.80	5.00	5.60	6.40	7.20	8.00	8.80
90	1.80	2.70	3.60	4.50	5.40	5.62½	6.30	7.20	8.10	9.00	9.90
100	2.00	3.00	4.00	5.00	6.00	6.25	7.00	8.00	9.00	10.00	11.00

Nos	12 ct.	12½ ct.	13 ct.	14 ct.	15 ct.	16 ct.	18 ct.	18¾ ct.	19 ct.	20 ct.	21 ct.
2	.24	.25	.26	.28	.30	.32	.36	.37½	.38	.40	.42
3	.36	.37½	.39	.42	.45	.48	.54	.56¼	.57	.60	.63
4	.48	.50	.52	.56	.60	.64	.72	.75	.76	.80	.84
5	.60	.62½	.65	.70	.75	.80	.90	.93¾	.95	1.00	1.05
6	.72	.75	.78	.84	.90	.96	1.08	1.12½	1.14	1.20	1.26
7	.84	.87½	.91	.98	1.05	1.12	1.26	1.31¼	1.33	1.40	1.47
8	.96	1.00	1.04	1.12	1.20	1.28	1.44	1.50	1.52	1.60	1.68
9	1.08	1.12½	1.17	1.26	1.35	1.44	1.62	1.68¾	1.71	1.80	1.89
10	1.20	1.25	1.30	1.40	1.50	1.60	1.80	1.87½	1.90	2.00	2.10
11	1.32	1.37½	1.43	1.54	1.65	1.76	1.98	2.06¼	2.09	2.20	2.31
12	1.44	1.50	1.56	1.68	1.80	1.92	2.16	2.25	2.28	2.40	2.52
13	1.56	1.62½	1.69	1.82	1.95	2.08	2.34	2.43¾	2.47	2.60	2.73
14	1.68	1.75	1.82	1.96	2.10	2.24	2.52	2.62½	2.66	2.80	2.94
15	1.80	1.87½	1.95	2.10	2.25	2.40	2.70	2.81¼	2.85	3.00	3.15
16	1.92	2.00	2.08	2.24	2.40	2.56	2.88	3.00	3.04	3.20	3.36
17	2.04	2.12½	2.21	2.38	2.55	2.72	3.06	3.18¾	3.23	3.40	3.57
18	2.16	2.25	2.34	2.52	2.70	2.88	3.24	3.37½	3.42	3.60	3.78
19	2.28	2.37½	2.47	2.66	2.85	3.04	3.42	3.56¼	3.61	3.80	3.99
20	2.40	2.50	2.60	2.80	3.00	3.20	3.60	3.75	3.80	4.00	4.20
25	3.00	3.12½	3.25	3.50	3.75	4.00	4.50	4.68¾	4.75	5.00	5.25
30	3.60	3.75	3.90	4.20	4.50	4.80	5.40	5.62½	5.70	6.00	6.30
40	4.80	5.00	5.20	5.60	6.00	6.40	7.20	7.50	7.60	8.00	8.40
50	6.00	6.25	6.50	7.00	7.50	8.00	9.00	9.37½	9.50	10.00	10.50
60	7.20	7.50	7.80	8.40	9.00	9.60	10.80	11.25	11.40	12.00	12.60
70	8.40	8.75	9.10	9.80	10.50	11.20	12.60	13.12½	13.30	14.00	14.70
80	9.60	10.00	10.40	11.20	12.00	12.80	14.40	15.00	15.20	16.00	16.80
90	10.80	11.25	11.70	12.60	13.50	14.40	16.20	16.87½	17.10	18.00	18.90
100	12.00	12.50	13.00	14.00	15.00	16.00	18.00	18.75	19.00	20.00	20.00

READY RECKONER.

The first column on the left contains the NUMBER of the Article, and the column on the tops of the Tables, the PRICE.

Nos	22 ct.	23 ct.	24 ct.	25 ct.	26 ct.	27 ct.	28 ct	29 ct.	30 ct.	31 ct.	31 c
2	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.62½
3	.66	.69	.72	.75	.78	.81	.84	.87	.90	.93	.93¾
4	.88	.92	.96	1.00	1.04	1.08	1.12	1.16	1.20	1.24	1.25
5	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.56¼
6	1.32	1.38	1.44	1.50	1.56	1.62	1.68	1.74	1.80	1.86	1.87½
7	1.54	1.61	1.68	1.75	1.82	1.89	1.96	2.03	2.10	2.17	2.18¾
8	1.76	1.84	1.92	2.00	2.08	2.16	2.24	2.32	2.40	2.48	2.50
9	1.98	2.07	2.16	2.25	2.34	2.43	2.52	2.61	2.70	2.79	2.81¼
10	2.20	2.30	2.40	2.50	2.60	2.70	2.80	2.90	3.00	3.10	3.12½
11	2.42	2.53	2.64	2.75	2.86	2.97	3.08	3.19	3.30	3.41	3.43¾
12	2.64	2.76	2.88	3.00	3.12	3.24	3.36	3.48	3.60	3.72	3.75
13	2.86	2.99	3.12	3.25	3.38	3.51	3.64	3.77	3.90	4.03	4.06¼
14	3.08	3.22	3.36	3.50	3.64	3.78	3.92	4.06	4.20	4.34	4.37½
15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	4.50	4.55	4.68¾
16	3.52	3.68	3.84	4.00	4.16	4.32	4.48	4.64	4.80	4.96	5.00
17	3.74	3.91	4.08	4.25	4.42	4.59	4.76	4.93	5.10	5.27	5.31¼
18	3.96	4.14	4.32	4.50	4.68	4.86	5.04	5.22	5.40	5.58	5.62½
19	4.18	4.37	4.56	4.75	4.94	5.13	5.32	5.51	5.70	5.89	5.93¾
20	4.40	4.60	4.80	5.00	5.20	5.40	5.60	5.80	6.00	6.20	6.25
25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.25	7.75	7.81¼
30	6.60	6.90	7.20	7.50	7.80	8.10	8.40	8.70	9.00	9.30	9.37½
40	8.80	9.20	9.60	10.00	10.40	10.80	11.20	11.60	12.00	12.40	12.50
50	11.00	11.50	12.00	12.50	18.00	13.50	14.00	14.50	15.00	15.50	15.62½
60	13.20	13.80	14.40	15.00	15.60	16.20	16.80	17.40	18.00	18.60	18.75
70	15.40	16.10	16.80	17.50	18.20	18.90	19.60	20.30	21.00	21.70	21.87½
80	17.60	18.40	19.20	20.00	20.80	21.60	22.40	23.20	24.00	24.80	25.00
90	19.80	20.70	21.60	22.50	23.40	24.30	25.20	26.10	27.00	27.90	28.12½
100	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	31.25

Nos	32 ct.	33 ct.	33⅓ ct.	34 ct.	35 ct.	36 ct.	37 ct.	37½ ct.	38 ct.	39 ct.	40 ct.
2	.64	.66	.66⅔	.68	.70	.72	.74	.75	.76	.78	.80
3	.96	.99	1.00	1.02	1.05	1.08	1.11	1.12½	1.14	1.17	1.20
4	1.28	1.32	1.33⅓	1.36	1.40	1.44	1.48	1.50	1.52	1.56	1.60
5	1.60	1.65	1.66⅔	1.70	1.75	1.80	1.85	1.87½	1.90	1.95	2.00
6	1.92	1.98	2.00	2.04	2.10	2.16	2.22	2.25	2.28	2.34	2.40
7	2.24	2.31	2.33⅓	2.38	2.45	2.52	2.59	2.62½	2.66	2.73	2.80
8	2.56	2.64	2.66⅔	2.72	2.80	2.88	2.96	3.00	3.04	3.12	3.20
9	2.88	2.97	3.00	3.06	3.15	3.24	3.33	3.37½	3.42	3.51	3.60
10	3.20	3.30	3.33⅓	3.40	3.50	3.60	3.70	3.75	3.80	3.90	4.00
11	3.52	3.63	3.66⅔	3.74	3.85	3.96	4.07	4.12½	4.18	4.29	4.40
12	3.84	3.96	4.00	4.08	4.20	4.32	4.44	4.50	4.56	4.68	4.80
13	4.16	4.29	4.33⅓	4.42	4.55	4.68	4.81	4.87½	4.94	5.07	5.20
14	4.48	4.62	4.66⅔	4.76	4.90	5.04	5.18	5.25	5.32	5.46	5.60
15	4.80	4.95	5.00	5.10	5.25	5.40	5.55	5.62½	5.70	5.85	6.00
16	5.12	5.28	5.33⅓	5.44	5.60	5.76	5.92	6.00	6.08	6.24	6.40
17	5.44	5.61	5.66⅔	5.78	5.95	6.12	6.29	6.37½	6.46	6.63	6.80
18	5.76	5.94	6.00	6.12	6.30	6.48	6.66	6.75	6.84	7.02	7.20
19	6.08	6.27	6.33⅓	6.46	6.65	6.84	7.03	7.12½	7.22	7.41	7.60
20	6.40	6.60	6.66⅔	6.80	7.00	7.20	7.40	7.50	7.60	7.80	8.00
25	8.00	8.25	8.33⅓	8.50	8.75	9.00	9.25	9.37½	9.50	9.75	10.00
30	9.60	9.90	10.00	10.20	10.50	10.80	11.10	11.25	11.40	11.70	12.00
40	12.80	13.20	13.33⅓	13.60	14.00	14.40	14.80	15.00	15.20	15.60	16.00
50	16.00	16.50	16.66⅔	17.00	17.50	18.00	18.50	18.75	19.00	19.50	20.00
60	19.20	19.80	20.00	20.40	21.00	21.60	22.20	22.50	22.80	23.40	24.00
70	22.40	23.10	23.33⅓	23.80	24.50	25.20	25.90	26.25	26.60	27.30	28.00
80	25.60	26.40	26.66⅔	27.20	28.00	28.80	29.60	30.00	30.40	31.20	32.00
90	28.80	29.70	30.00	30.60	31.50	32.40	33.30	33.75	34.20	35.10	36.00
100	32.00	33.00	33.33⅓	34.00	35.00	36.00	37.00	37.50	38.00	39.00	40.00

READY RECKONER.

The first column on the left contains the NUMBER of the Article, and the column on the tops of the Tables. the PRICE.

Nos	41 ct.	42 ct.	43 ct.	44 ct.	45 ct.	46 ct.	47 ct.	48 ct.	49 ct.	50 ct.	51 ct.
2	.82	.84	.86	.88	.90	.92	.94	.96	.98	1.00	1.02
3	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.53
4	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.00	2.04
5	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55
6	2.46	2.52	2.58	2.64	2.70	2.76	2.80	2.88	2.94	3.00	3.06
7	2.87	2.94	3.01	3.08	3.15	3.22	3.29	3.36	3.43	3.50	3.57
8	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.00	4.08
9	3.69	3.78	3.87	3.96	4.05	4.14	4.23	4.32	4.41	4.50	4.59
10	4.10	4.20	4.30	4.40	4.50	4.60	4.70	4.80	4.90	5.00	5.10
11	4.51	4.62	4.73	4.84	4.95	5.06	5.17	5.28	5.39	5.50	5.61
12	4.92	5.04	5.16	5.28	5.40	5.52	5.64	5.76	5.88	6.00	6.12
13	5.33	5.46	5.59	5.72	5.85	5.98	6.11	6.24	6.37	6.50	6.63
14	5.74	5.88	6.02	6.16	6.30	6.44	6.58	6.72	6.86	7.00	7.14
15	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	7.50	7.65
16	6.56	6.72	6.88	7.04	7.20	7.36	7.52	7.68	7.84	8.00	8.16
17	6.97	7.14	7.31	7.48	7.65	7.82	7.99	8.16	8.33	8.50	8.67
18	7.38	7.56	7.74	7.92	8.10	8.28	8.46	8.64	8.82	9.00	9.18
19	7.79	7.98	8.17	8.30	8.55	8.74	8.93	9.12	9.31	9.50	9.69
20	8.20	8.40	8.60	8.80	9.00	9.20	9.40	9.60	9.80	10.00	10.20
25	10.25	10.50	10.75	11.00	11.25	11.50	11.75	12.00	12.25	12.50	12.75
30	12.30	12.60	12.90	13.20	13.50	13.80	14.10	14.40	14.70	15.00	15.30
40	16.40	16.80	17.20	17.60	18.00	18.40	18.80	19.20	19.60	20.00	20.40
50	20.50	21.00	21.50	22.00	22.50	23.00	23.50	24.00	24.50	25.00	25.50
60	24.60	25.20	25.80	26.40	27.00	27.60	28.20	28.80	29.40	30.00	30.60
70	28.70	29.40	30.10	30.80	31.50	32.20	32.90	33.00	34.30	35.00	35.70
80	32.80	33.60	34.40	35.20	36.00	36.80	37.60	38.40	39.20	40.00	40.80
90	36.90	37.80	38.70	39.60	40.50	41.40	42.30	43.20	44.10	45.00	45.92
100	41.00	42.00	43.00	44.00	45.00	46.00	47.00	48.00	49.00	50.00	51.00

Nos	52 ct.	53 ct.	54 ct.	55 ct.	56 ct.	57 ct.	58 ct.	59 ct.	60 ct	61 ct.	62 ct.
2	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24
3	1.56	1.59	1.62	1.65	1.68	1.71	1.74	1.77	1.80	1.83	1.86
4	2.08	2.12	2.16	2.20	2.24	2.28	2.32	2.36	2.40	2.44	2.48
5	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
6	3.12	3.18	3.24	3.30	3.36	3.42	3.48	3.54	3.60	3.66	3.72
7	3.64	3.71	3.78	3.85	3.92	3.99	4.06	4.13	4.20	4.27	4.34
8	4.16	4.24	4.32	4.40	4.48	4.56	4.64	4.72	4.80	4.88	4.96
9	4.68	4.77	4.86	4.95	5.04	5.13	5.22	5.31	5.40	5.49	5.58
10	5.20	5.30	5.40	5.50	5.60	5.70	5.80	5.90	6.00	6.10	6.20
11	5.72	5.83	5.94	6.05	6.16	6.27	6.38	6.49	6.60	6.71	6.82
12	6.24	6.36	6.48	6.60	6.72	6.84	6.96	7.08	7.20	7.32	7.44
13	6.76	6.89	7.02	7.15	7.28	7.41	7.54	7.67	7.80	7.93	8.06
14	7.28	7.42	7.56	7,70	7.84	7.98	8.12	8.26	8.40	8.54	8.68
15	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	9.00	9.15	9.30
16	8.32	8.48	8.64	8.80	8.96	9.12	9.28	9.44	9.60	9.76	9.92
17	8.84	9.01	9.18	9.35	9.52	9.69	9.86	10.03	10.20	10.37	10.54
18	9.36	9.54	9.72	9.90	10.08	10.26	10.44	10.62	10.80	10.98	11.16
19	9.88	10.07	10.26	10.45	10.64	10.83	11.02	11.21	11.40	11.59	11.78
20	10.40	10.60	10.80	11.00	11.20	11.40	11.60	11.80	12.00	12.20	12.40
25	13.00	13.25	13.50	13.75	14.00	14.25	14.50	14.75	15.00	15.25	15.50
30	15.60	15.90	16.20	16.50	16.80	17.10	17.40	17.70	18.00	18.30	18.60
40	20.80	21.10	21.60	22.00	22.40	22.80	23.20	23.60	24.00	24.42	24.80
50	26.00	26.50	27.00	27.50	28.00	28.50	29.00	29.50	30.00	30.50	31.00
60	31.20	31.80	32.40	33.00	33.60	34.20	34.80	35.40	36.00	36.60	37.20
70	36.40	37.10	37.80	38.50	39.20	39.90	40.60	41.30	42.00	42.70	43.40
80	41.60	42.40	43.20	44.00	44.80	45.60	46.40	47.20	48.00	48.80	49.60
90	46.80	47.70	48.60	49.50	50.40	51.30	52.20	53.10	54.00	54.90	55.80
100	52.00	53.00	54.00	55.00	56.00	57.00	58.00	59.00	60.00	61.00	62.00

READY RECKONER.

If the Number required is not found in the Tables, add two Numbers together; for instance, if 35 bushels are required, add the prices opposite 30 and 5 together; and so for 365 bushels—treble the value of 100, and and 60 and 5 together.

Nos	62½ ct.	63 ct.	64 ct.	65 ct.	66 ct.	66⅔ ct.	67 ct.	68 ct.	69 ct.	70 ct.	71 ct.
2	1.25	1.26	1.28	1.30	1.32	1.33⅓	1.34	1.36	1.38	1.40	1.42
3	1.87½	1.89	1.92	1.95	1.98	2.00	2.01	2.04	2.07	2.10	2.13
4	2.50	2.52	2.56	2.60	2.64	2.66⅔	2.68	2.72	2.76	2.80	2.84
5	3.12½	3.15	3.20	3.25	3.30	3.33⅓	3.35	3.40	3.45	3.50	3.55
6	3.75	3.78	3.84	3.90	3.96	4.00	4.02	4.08	4.14	4.20	4.26
7	4.37½	4.41	4.48	4.55	4.62	4.66⅔	4.69	4.76	4.83	4.90	4.97
8	5.00	5.04	5.12	5.20	5.28	5.33⅓	5.36	5.44	5.52	5.60	5.68
9	5.62½	5.67	5.76	5.85	5.94	6.00	6.03	6.12	6.21	6.30	6.39
10	6.25	6.30	6.40	6.50	6.60	6.66⅔	6.70	6.80	6.90	7.00	7.10
11	6.87½	6.93	7.04	7.15	7.26	7.33⅓	7.37	7.48	7.59	7.70	7.81
12	7.50	7.56	7.68	7.80	7.92	8.00	8.04	8.16	8.28	8.40	8.52
13	8.12½	8.19	8.32	8.45	8.58	8.66⅔	8.71	8.84	8.97	9.10	9.23
14	8.75	8.80	8.96	9.10	9.24	9.33⅓	9.38	9.52	9.66	9.80	9.94
15	9.37½	9.45	9.60	9.75	9.90	10.00	10.05	10.20	10.35	10.50	10.65
16	10.00	10.08	10.24	10.40	10.56	10.66⅔	10.72	10.88	11.04	11.20	11.36
17	10.62½	10.71	10.88	11.05	11.22	11.33⅓	11.39	11.56	11.73	11.90	12.07
18	11.25	11.34	11.52	11.70	11.88	12.00	12.06	12.24	12.42	12.60	12.78
19	11.87½	11.97	12.16	12.35	12.54	12.66⅔	12.73	12.92	13.11	13.30	13.49
20	12.50	12.60	12.80	13.00	13.20	13.33⅓	13.40	13.60	13.80	14.00	14.20
25	15.62½	15.75	16.00	16.25	16.50	16.66⅔	16.75	17.00	17.25	17.50	17.75
30	18.75	18.90	19.20	19.50	19.80	20.[illegible]	20.10	20.40	20.70	21.00	21.30
40	25.00	25.20	25.60	26.00	26.40	26.66⅔	26.80	27.20	27.60	28.00	28.40
50	31.25	31.50	32.00	32.50	33.00	33.33⅓	33.50	34.00	34.50	35.00	35.50
60	37.50	37.80	38.40	39.00	39.60	40.00	40.20	40.80	41.40	42.00	42.60
70	43.75	44.10	44.80	45.50	46.20	46.66⅔	46.90	47.60	48.30	49.00	49.70
80	50.00	50.40	51.20	52.00	52.80	53.33⅓	53.00	54.40	55.20	56.00	56.80
90	51.25	56.70	57.60	58.50	59.40	60.00	60.30	61.20	62.10	63.00	63.90
100	62.50	63.00	64.00	65.00	66.00	66.66⅔	67.00	68.00	69.00	70.00	71.00

Nos	72 ct.	73 ct.	74 ct.	75 ct.	76 ct.	77 ct.	78 ct.	79 ct.	80 ct.	81 ct.	82 ct.
2	1.44	1.46	1.48	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64
3	2.16	2.19	2.22	2.25	2.28	2.31	2.34	2.37	2.40	2.43	2.46
4	2.88	2.92	2.96	3.00	3.04	3.08	3.12	3.16	3.20	3.24	3.28
5	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00	4.05	4.10
6	4.32	4.38	4.44	4.50	4.56	4.62	4.68	4.74	4.80	4.86	4.92
7	5.04	5.11	5.18	5.25	5.32	5.39	5.46	5.53	5.60	5.67	5.74
8	5.76	5.84	5.92	6.00	6.08	6.16	6.24	6.32	6.40	6.48	6.56
9	6.48	3.57	6.66	6.75	6.84	6.93	7.02	7.11	7.20	7.29	7.38
10	7.20	7.30	7.40	7.50	7.60	7.70	7.80	7.90	8.00	8.10	8.20
11	7.92	8.03	8.14	8.25	8.30	8.47	8.58	8.69	8.80	8.91	9.02
12	8.64	8.76	8.88	9.00	9.12	9.24	9.36	9.48	9.60	9.72	9.84
13	9.36	9.49	9.62	9.75	9.88	10.01	10.14	10.27	10.40	10.53	10.66
14	10.08	10.22	10.36	10.50	10.64	10.78	10.92	11.06	11.20	11.34	11.48
15	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	12.00	12.15	12.30
16	11.52	11.68	11.84	12.00	12.16	12.32	12.48	12.64	12.80	12.96	13.12
17	12.24	12.41	12.58	12.75	12.92	13.09	13.26	13.43	13.60	13.77	13.94
18	12.96	13.14	13.32	13.50	13.68	13.86	14.04	14.22	14.40	14.58	14.76
19	13.68	13.87	14.06	14.25	14.44	14.63	14.82	15.01	15.20	15.39	15.58
20	14.40	14.60	14.80	15.00	15.20	15.40	15.60	15.80	16.00	16.20	16.40
25	18.00	18.25	18.50	18.75	19.00	19.25	19.50	19.75	20.00	20.25	20.50
30	21.60	21.90	22.20	22.50	22.80	23.10	23.40	23.70	24.00	24.30	24.60
40	28.80	29.20	29.60	30.00	30.40	30.80	31.20	31.60	32.00	32.40	32.80
50	36.00	36.50	37.00	37.50	38.00	38.50	39.00	39.50	40.00	40.50	41.00
60	43.20	43.80	44.40	45.00	45.60	46.20	46.80	47.40	48.00	48.60	49.20
70	50.40	51.10	51.80	52.50	53.20	53.90	54.60	55.30	56.00	56.70	57.40
80	57.60	58.40	59.20	60.00	60.80	61.60	62.40	63.20	64.00	64.80	65.60
90	64.80	65.70	66.60	67.50	68.40	69.30	70.20	71.10	72.00	72.90	73.80
100	72.00	73.00	74.00	75.00	76.00	77.00	78.00	79.00	80.00	81.00	82.00

If the Number required is not found in the Tables, add two Numbers together; for instance, if 35 bushels are required, add the prices opposite 20 and 5 together; and so for 365 bushels—treble the value of 100, and add 60 and 5 together.

Nos	83 ct.	84 ct.	85 ct.	86 ct.	87 ct.	87½ ct.	88 ct.	89 ct.	90 ct.	91 ct.	92 ct.
2	1.66	1.68	1.70	1.72	1.74	1.75	1.76	1.78	1.80	1.82	1.84
3	2.49	2.52	2.55	2.28	2.61	2.62½	2.64	2.67	2.70	2.73	2.76
4	3.32	3.36	3.40	3.44	3.48	3.50	3.52	3.56	3.60	3.64	3.68
5	4.15	4.20	4.25	4.30	4.35	4.37½	4.40	4.45	4.50	4.55	4.60
6	4.98	5.04	5.10	5.16	5.22	5.25	5.28	5.34	5.40	5.46	5.52
7	5.81	5.88	5.95	6.02	6.09	6.12½	6.16	6.23	6.30	6.37	6.44
8	6.64	6.72	6.80	6.88	6.96	7.00	7.04	7.12	7.20	7.28	7.36
9	7.47	7.56	7.65	7.74	7.83	7.87½	7.92	8.01	8.10	8.19	8.28
10	8.30	8.40	8.50	8.60	8.70	8.75	8.80	8.90	9.00	9.10	9.20
11	9.13	9.24	9.35	9.46	9.57	9.62½	9.68	9.79	9.90	10.01	10.12
12	9.96	10.08	10.20	10.32	10.44	10.50	10.56	10.68	10.80	10.92	11.04
13	10.79	10.92	11.05	11.18	11.31	11.37½	11.44	11.57	11.70	11.83	11.96
14	11.62	11.76	11.90	12.04	12.18	12.25	12.32	12.46	12.00	12.74	12.88
15	12.45	12.60	12.75	12.90	13.05	13.12½	13.20	13.35	13.50	13.65	13.80
16	13.28	13.44	13.60	13.76	13.92	14.00	14.08	14.24	14.40	14.56	14.72
17	14.11	14.28	14.45	14.62	14.79	14.87½	14.96	15.13	15.30	15.47	15.64
18	14.94	15.12	15.30	15.48	15.66	15.75	15.84	16.02	16.20	16.38	16.56
19	15.77	15.96	16.15	16.34	16.53	16.62½	16.72	16.91	17.10	17.29	17.48
20	16.60	16.80	17.00	17.20	17.40	17.50	17.60	17.80	18.00	18.20	18.40
25	20.75	21.00	21.25	21.50	21.75	21.87½	22.00	22.25	22.50	22.75	23.00
30	24.90	25.20	25.50	25.80	26.10	26.25	26.40	26.70	27.00	27.30	27.60
40	33.20	33.60	34.00	34.40	34.80	35.00	35.20	35.60	36.00	36.40	36.80
50	41.50	42.00	42.50	43.00	43.50	43.75	44.00	44.50	45.00	45.50	46.00
60	49.80	50.40	51.00	51.60	52.20	52.50	52.80	53.40	54.00	54.60	55.20
70	58.10	58.80	59.50	60.20	69.90	61.25	61.60	62.30	63.00	63.70	64.40
80	66.40	67.20	68.00	68.80	69.60	70.00	70.40	74.20	72.00	72.80	73.60
90	74.70	75.60	76.50	77.40	78.30	78.75	79.20	80.10	81.00	81.90	82.80
100	83.00	84.00	85.00	86.00	87.00	87.50	88.00	89.00	90.00	91.00	92.00

Nos	93 ct.	94 ct.	95 ct.	96 ct.	97 ct.	98 ct.	99 ct.	$1.	$2.	$3.
2	1.86	1.88	1.90	1.92	1.94	1.96	1.98	2.	4.	6.
3	2.79	2.82	2.85	2.88	2.91	2.94	2.97	3.	6.	9.
4	3.72	3.76	3.80	3.84	3.88	3.92	3.66	4.	8.	12.
5	4.65	4.70	4.75	4.80	4.85	4.90	4.95	5.	10.	15.
6	5.58	5.64	5.70	5.76	5.82	5.88	5.94	6.	12.	18.
7	6.51	6.58	6.65	6.72	6.79	6.86	6.93	7.	14.	21.
8	7.44	7.52	7.60	7.68	7.76	7.84	7.92	8.	16.	24.
9	8.37	8.46	8.55	8.64	8.73	8.82	8.91	9.	18.	27.
10	9.30	9.40	9.50	9.60	9.70	9.80	9.90	10.	20.	30.
11	10.23	10.34	10.45	10.56	10.67	10.78	10.89	11.	22.	33.
12	11.16	11.28	11.40	11.52	11.64	11.76	11.88	12.	24.	36.
13	12.09	12.22	12.35	12.48	12.61	12.74	12.87	13.	26.	39.
14	13.02	13.16	13.30	13.44	13.58	13.72	13.86	14.	28.	42.
15	13.95	14.10	14.25	14.40	14.55	14.70	14.85	15.	30.	45.
16	14.88	15.04	15.20	15.36	15.52	15.68	15.84	16.	32.	48.
17	15.81	15.98	16.15	16.32	16.49	16.66	16.83	17.	34.	51.
18	16.74	16.92	17.10	17.28	17.46	17.64	17.82	18.	36.	54.
19	17.67	17.86	18.05	18.24	18.43	18.62	18.81	19.	38.	57.
20	18.60	18.80	19.00	19.20	19.40	19.60	19.80	20.	40.	60.
25	23.25	23.50	23.75	24.00	24.25	24.50	24.75	25.	50.	75.
30	27.90	29.20	28.50	28.80	29.10	29.40	29.70	30.	60.	90.
40	37.20	37.60	38.00	38.40	38.80	39.20	39.00	40.	80.	120.
50	46.50	47.00	47.50	48.00	48.50	49.00	49.50	50.	100.	150.
60	55.80	56.40	57.00	57.60	58.20	58.80	59.40	60.	120.	180.
70	65.10	65.80	66.50	67.20	67.90	68.60	69.30	70.	142.	210.
80	74.40	75.20	76.00	76.80	77.60	78.40	79.20	80.	160.	240.
90	83.70	84.60	85.50	86.40	87.30	88.20	89.10	90.	180.	270.
100	93.00	94.00	95.00	96.00	97.00	98.00	99.00	100.	200.	300.

SCANTLING AND TIMBER MEASURE

REDUCED TO ONE INCH BOARD MEASURE.

EXPLANATION.—To ascertain the number of Feet of Scantling or Timber, say 18 Feet Long and 2 by 3 Inches. Find 2 by 3 in the top columns, and 18 in the left hand column, and under 2 by 3 and against 18 is 9 feet.

If the Scantling is longer than contained in the Table, add two lengths together. If shorter, take part of some length.

Feet.	THICKNESS AND WIDTH IN INCHES.															
	2.2	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**	**2.8**	**2.9**	**3.3**	**3.4**	**3.5**	**3.6**	**3.7**	**3.8**	**3.9**	**4.4**
6	2.	3.	4.	5.	6.	7.	8.	9.	4.6	6.	7.6	9.	10.6	12.	13.6	8.
7	2.4	3.6	4.8	5.10	7.	8. 2	9.4	10.6	5.3	7.	8.9	10.6	12.3	14.	15.9	9 4
8	2.8	4.	5.4	6. 8	8.	9. 4	10.8	12.	6.	8.	10.	12.	14.	16.	18.	10.8
9	3.	4.6	6.	7. 6	9.	10. 6	12.	13.6	6.9	9.	11.3	13.6	15.9	18.	20.3	12.
10	3 4	5.	6.8	8. 4	10.	11. 8	13.4	15.	7.6	10.	12.6	15.	17.6	20.	22 6	13.4
11	3.8	5.6	7.4	9. 2	11.	12.10	14.8	16.6	8.3	11.	13.9	16.6	19.3	22.	24.9	14.8
12	4.	6.	8.	10.	12.	14.	16.	18.	9.	12.	15.	18.	21.	24.	27.	16.
13	4.4	6.6	8.8	10.10	13.	15. 2	17.4	19.6	9.9	13.	16.3	19.6	22.9	26.	29.3	17.4
14	4.8	7.	9 4	11. 8	14.	16. 4	18.8	21.	10.6	14.	17.6	21.	24.6	28.	31.6	18.8
15	5.	7.6	10.	12. 6	15.	17. 6	20.	22.6	11.3	15.	18.9	22.6	26.3	30	33.9	20.
16	5.4	8.	10.8	13. 4	16.	18. 8	21.4	24.	12.	16.	20.	24.	28.	32.	36.	21.4
17	5.8	8.6	11.4	14. 2	17.	19.10	22.8	25 6	12.9	17	21.3	25.6	29.9	34.	38.3	22.8
18	6.	9.	12.	15.	18.	21.	24.	27.	13.6	18.	22 6	27.	31.6	36.	40.6	24.
19	6.4	9.6	12.8	15.10	19.	22. 2	25.4	28.6	14.3	19.	23.9	28.6	33.3	38.	42.9	25.4
20	6.8	10.	13.4	16. 8	20.	23. 4	26.8	30.	15.	20.	25.	30.	35.	40.	45.	26.8
21	7.	10.6	14.	17. 6	21.	24. 6	28.	31.6	15.9	21.	26 3	31.6	36.9	42.	47.3	28.
22	7.4	11.	14.8	18. 4	22.	25. 8	29.4	33.	16.6	22.	27.6	33.	38 6	44.	49.6	29.4
23	7.8	11.6	15.4	19. 2	23.	26.10	30.8	34.6	17.3	23.	28 9	34.6	40.3	46.	51.9	30 8
24	8.	12.	16.	20.	24.	28.	32.	36.	18.	24.	30.	36.	42.	48.	54	32.
25	8 4	12.6	16.8	20.10	25.	29. 2	33.4	37 6	18.9	25.	31 3	37.6	43.9	50.	56.3	33.4
30	10.	15.	20.	25	30.	35.	40.	45.	22.6	30.	37.6	45.	52.6	60.	67.6	40.
34	11.4	17.	22.8	28. 4	34.	39. 8	45.4	51.	25 6	34.	42.6	51.	59.6	68.	76 6	45.4
40	13.4	20.	26.8	33. 4	40.	46. 8	53.4	60.	30.0	40.	50.	60.	70.	80	90	53.

Feet.	THICKNESS AND WIDTH IN INCHES.														
	5.4	**4.6**	**4.7**	**4.8**	**4.9**	**5.5**	**5.6**	**5.7**	**5.8**	**5.9**	**6.6**	**6.7**	**6.8**	**6.9**	**6.10**
6	10.	12.	14.	16.	18.	12. 6	15.	17. 6	20.	22 6	18.	21.	24.	27.	30.
7	11.8	14.	16.4	18.8	21.	14. 7	17.6	20. 5	23.4	26 3	21.	24.6	28.	31.6	35.
8	13.4	16.	18.8	21.4	24.	16. 8	20.	23. 4	26.8	30.	24.	28.	32	36.	40.
9	15.	18.	21.	24.	27.	18. 9	22.6	26. 3	30.	33.9	27.	31.6	36	40.6	45.
10	16.8	20.	23.4	26.8	30.	20.10	25.	29. 2	33.4	37.6	30	35.	40.	45.	50.
11	18.4	22.	25.8	29.4	33.	22.11	27.6	32. 1	36.8	41.3	33.	38.6	44.	49.6	55.
12	20.	24.	28.	32.	36.	25.	30.	35.	40.	45.	36.	42.	48.	54.	60.
13	21.8	26.	30.4	34.8	39.	27. 1	32.6	37.11	43.4	48.9	39.	45.6	52.	58.6	65.
14	23.4	28.	32.8	37.4	42.	29. 2	35.	40.10	46.8	52.6	42.	49.	56.	63.	70.
15	25.	30.	35.	40.	45.	31. 3	37.6	43. 9	50.	56.3	45.	52.6	60.	67.6	75.
16	26.8	32.	37.4	42.8	48.	33. 4	40.	46. 8	53.4	60.	48.	56.	64.	72.	80.
17	28.4	34.	39.8	45.4	51.	35. 5	42.6	49. 7	56.8	63.9	51.	59.6	68.	76.6	85.
18	30.	36.	42.	48.	54.	37. 6	45.	52. 6	60.	67 6	54.	63.	72.	81.	90.
19	31.8	38.	44.4	50.8	57.	39. 7	47.6	55. 5	63 4	71 3	57.	66.6	76.	85 6	95.
20	33.4	40.	46.8	53.4	60.	41. 8	50.	58. 4	66.8	75.	60.	70	80.	90.	100.
21	35.	42.	49.	56.	63.	43. 9	52.6	61. 3	70.	78 9	63	73.6	84.	94.6	105
22	36.8	44.	51.4	58.8	66.	45.10	55.	64. 2	73.4	82.6	66.	77.	88	99.	110.
23	38.4	46.	53.8	61.4	69.	47.11	57.6	67. 1	76.8	86.3	69.	80 6	92	103.6	115
24	40.	48.	56.	64.	72.	50.	60.	70.	80.	90.	72.	84.	96.	108.	120
25	41.8	50.	58.4	66.8	75.	52. 1	62.6	72.11	83.4	93.9	75.	87 6	100.	112.6	125
30	50.	60.	70.	80.	90.	62. 6	75.	87. 6	100.	112.6	90.	105.	120.	135	150
34	56.8	68.	79.4	90.8	102.	70.10	85.	99. 2	113.4	127.6	102.	119.	136.	153	170.
40	66.8	80.	93.4	106.8	120.	83. 4	100.	116.8	133.4	150.	120.	140.	160.	180.	200.

THICKNESS AND WIDTH IN INCHES.

1	6.12	7.7	7.8	7.9	7.10	7.11	7.12	8.8	8.9	8.10	8.11	8.12
.	36.	24. 6	28.	31.6	35.	38. 6	42.	32.	36.	40.	44.	48.
.6	42.	28. 7	32.8	36.9	40.10	44.11	49.	37.4	42.	46.8	51.4	56.
.	48.	32. 8	37.4	42.	46. 8	51. 4	56.	42.8	48.	53.4	58.8	64.
.6	54.	36. 9	42.	47.3	52. 6	57. 9	63.	48.	54.	60.	66.	72.
.	60.	40.10	46.8	52.6	58. 4	64. 2	70.	53.4	60.	66.8	73.4	80.
.6	66.	44.11	51.4	57.9	64. 2	70. 7	77.	58.8	66.	73.4	80.8	88.
.	72.	49.	56.	63.	70.	77.	84.	64.	72.	80.	88.	96.
.6	78.	53. 1	60 8	68.3	75.10	83. 5	91.	69.4	78.	86.8	95.4	104.
.	84.	57. 2	65.4	73.6	81. 8	89.10	98.	74.8	84.	93.4	102.8	112.
.6	90.	61. 3	70.	78.9	87. 6	96. 3	105.	80.	90.	100.	110.	120.
.	96.	64. 4	74.8	84.	93. 4	102. 8	112.	85.4	96.	106.8	117.4	128.
.6	102.	69. 5	79.4	89.3	99. 2	109. 1	119.	90.8	102.	113.4	124.8	136.
.	108.	73. 6	84.	94.6	105.	115. 6	126.	96.	108.	120.	132.	144.
.6	114.	77. 7	88.8	99.9	110.10	121.11	133.	101.4	114.	126.8	139 4	152.
.	120.	81. 8	93.4	105.	116. 8	128. 4	140.	106.8	120.	133.4	146.8	160.
.6	126.	85. 9	98.	110.3	122. 6	134. 9	147.	112.	126.	140.	154.	168.
.	132.	89.10	102.8	115.6	128. 4	141. 2	154.	117.4	132.	146.8	161.4	176.
.6	138.	93.11	107.4	120.9	134. 2	147. 7	161.	122.8	138.	153.4	168.8	134.
.	144.	98.	112	126.	140.	154.	168.	128.	144	160.	176	192

9	9.10	9.11	9.12	10.10	10.11	10.12	11.11	11.12	12.12	12.13	12.14
.6	45.	49.6	54.	50.	55.	60.	60. 6	66.	72.	78.	84.
.3	52 6	57 9	63.	58.4	64. 2	70.	70. 7	77.	84.	91.	98.
.	60.	66.	72.	66.8	73. 4	80.	80. 8	83.	96.	104.	112.
.9	67.6	74.3	81.	75.	86. 6	90.	90. 9	99.	108.	117.	126.
.6	75.	82.6	90.	83.4	91. 8	100.	100.10	110.	120.	130.	140.
.3	82.6	90.9	99.	91.8	100.10	110.	110.11	121.	132.	143.	154.
.	90.	99.	108.	100.	110.	120.	121.	132.	144.	156.	168.
.9	97.6	107.3	117.	108.4	119. 2	130.	131. 1	143.	156.	169.	182.
.6	105.	115.6	126.	116.8	128. 4	140.	141. 2	154.	168.	182.	196.
.3	112.6	123.9	135.	125.	137. 6	150.	151. 3	165.	180.	195.	210.
.	120.	132.	144.	133.4	146. 8	160.	161. 4	176.	192.	208.	224.
.9	127.6	140.3	153.	141 8	155.10	170.	171. 5	187.	204.	221.	238.
.6	135.	148.6	162.	150.	165.	180.	181. 6	198.	216.	234.	252.
.3	142.6	156.9	171.	158.4	174. 2	190.	191. 7	209.	228.	247.	266.
.	150.	165.	180.	166.8	183. 4	200.	201. 8	220.	240.	260.	280.
.9	157.6	173.3	189.	175.	192. 6	210.	211. 9	231.	252.	273.	294.
.6	165.	181.6	198.	183.4	201. 8	220.	221.10	242.	264.	286.	308.
.3	172.6	189.9	207.	191.8	210.10	230.	231.11	253.	276.	299.	322.
.	180.	198.	216.	200.	220.	240.	242	264	288.	312	336.

.15	12.16	13.13	13.14	13.15	13.16	14.14	14.15	14.16	15.15	15.16
0.	96.	84. 6	91.	97.6	104.	98.	105.	112.	112.6	120.
5.	112.	98. 7	106. 2	113 9	121.4	114.4	122.6	130.8	131.3	140.
0.	128.	112. 8	121. 4	130.	138.8	130.8	140.	149.4	150.	160.
5.	144.	126. 9	136. 6	146.3	156.	147.	157.6	168.	168.9'	180.
0.	160.	140.10	151. 8	162.6	173.4	163 4	175.	186.8	187.6	200.
5.	176.	154.11	166.10	178.9	190.8	179 8	192.6	205.4	206.3	220.
0.	192.	169.	182.	195.	208.	196.	210.	224.	225	240.
5.	208.	183. 1	197. 2	211.3	225.4	212.4	227.6	242 8	243 9	260.
10.	224.	197. 2	212. 4	227.6	242.8	228.8	245	261 4	262.6	280.
25.	240	211. 3	227. 6	243 9	260.	245.	262.6	280	281 3	300.
0.	256.	225 4	242. 8	260.	277.4	261.4	280.	298 8	300.	320.
5	272.	239 5	257.10	276 3	294.8	277 8	297.6	317.4	318 9	340.
0.	288.	243. 6	273.	292 6	312.	290.	314.	336.	337.6	360.
5.	304.	257. 7	288. 2	308.9	329.4	310 4	332.6	354 8	356.3	380.
0.	320.	271. 8	303. 4	325.	346.8	326 8	350.	373.4	375	400.
15	336.	285. 9	318. 6	341.3	364	343.	367.6	392.	393.9	420.
0.	352.	299.10	333. 8	357.6	381.4	359 4	385.	410.8	412 6	440.
5.	368.	313.11	348 10	373.9	398.8	375.8	402.6	429 4	431.3	460.
0.	384.	338.	364.	390.	416.	392.	420.	448.	450.	480.

BOARD AND PLANK MEASUREMENT—AT SIGHT

This Table gives the Sq. Ft. and In. in Board from 6 to 25 in. wide, and from 8 to 36 ft. long If a board be longer than 36 ft., unite two numbers. Thus, if a Board is 40 ft. long and 16 in. wide, add 30 and 10 and you have 53 ft. 4 in. For 2-in Plank double the *product*.

Feet Long.	6 in W		7 in W		8 in W		9 in W		10in W		11in W		12in W		13 in W		14 in W		15 in W	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in	ft.	in.	ft	in.	ft.	in.	ft.	in	ft.	in.
8	4	0	4	8	5	4	6	0	6	8	7	4	8	0	8	8	9	4	10	0
9	4	6	5	3	6	0	6	9	7	6	8	3	9	0	9	9	10	6	11	3
10	5	0	5	10	6	8	7	6	8	4	9	2	10	0	10	10	11	8	12	6
11	5	6	6	5	7	4	8	3	9	2	10	1	11	0	11	11	12	10	12	9
12	6	0	7	0	8	0	9	0	10	0	11	0	12	0	13	0	14	0	15	0
13	6	6	7	7	8	8	9	9	10	10	11	11	13	0	14	1	15	2	16	3
14	7	0	8	2	9	4	10	6	11	8	12	10	14	0	15	2	16	4	17	6
15	7	6	8	9	10	0	11	3	12	6	13	9	15	0	16	3	17	6	18	9
16	8	0	9	4	10	8	12	0	13	4	14	8	16	0	17	4	18	8	20	0
17	8	6	9	11	11	4	12	9	14	2	15	7	17	0	18	5	19	10	21	3
18	9	0	10	6	12	0	13	6	15	0	16	6	18	0	19	6	21	0	22	6
19	9	6	11	1	12	8	14	3	15	10	17	5	19	0	20	7	22	2	23	9
20	10	0	11	8	13	4	15	0	16	8	18	4	20	0	21	8	23	4	25	0
21	10	6	12	3	14	0	15	9	17	6	19	3	21	0	22	9	24	6	26	3
22	11	0	12	10	14	8	16	6	18	4	20	2	22	0	23	10	25	8	27	6
23	11	6	13	5	15	4	17	3	19	2	21	1	23	0	24	11	26	10	28	9
24	12	0	14	0	16	0	18	0	20	0	22	0	24	0	26	0	28	0	30	0
25	12	6	14	7	16	8	18	9	20	10	22	11	25	0	27	1	29	2	31	3
26	13	0	15	2	17	4	19	6	21	8	23	10	26	0	28	2	30	4	32	6
27	13	6	15	9	18	0	20	3	22	6	24	9	27	0	29	3	31	6	33	9
28	14	0	16	4	18	8	21	0	23	4	25	8	28	0	30	4	32	8	35	0
29	14	6	16	11	19	4	21	9	24	2	26	7	29	0	31	5	33	10	36	3
30	15	0	17	6	20	0	22	6	25	0	27	6	30	0	32	6	35	0	37	6
31	15	6	18	1	20	8	23	3	25	10	28	5	31	0	33	7	36	2	38	9
32	16	0	18	8	21	4	24	0	26	8	29	4	32	0	34	8	37	4	40	0
33	16	6	19	3	22	0	24	9	27	6	30	3	33	0	35	9	38	6	41	3
34	17	0	19	10	22	8	25	6	28	4	31	2	34	0	36	10	39	8	42	6
35	17	6	20	5	23	4	26	3	29	2	32	1	35	0	37	11	40	10	43	9
36	18	0	21	0	24	0	27	0	30	0	33	0	36	0	39	0	42	0	45	0

BOARD TABLE MEASUREMENT—CONTINUED.

Feet Long.	16in W		17in W		18in W		19in W		20in W		21in W		22 in W		23 in W		24in W		25 in W	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
8	10	8	11	4	12	0	12	8	13	4	14	0	14	8	15	4	16	0	16	8
9	12	0	12	9	13	6	14	3	15	0	15	9	16	6	17	3	18	0	18	9
10	13	4	14	2	15	0	15	10	16	8	17	6	18	4	19	2	20	0	20	10
11	14	8	15	7	16	6	17	5	18	4	19	3	20	2	21	1	22	0	22	11
12	16	0	17	0	18	0	19	0	20	0	21	0	22	0	23	0	24	0	25	0
13	17	4	18	5	19	6	20	7	21	8	22	9	23	10	24	11	26	0	27	1
14	18	8	19	10	21	0	22	2	23	4	24	6	25	8	26	10	28	0	29	2
15	20	0	21	3	22	6	23	9	25	0	26	3	27	6	28	9	30	0	31	3
16	21	4	22	8	24	0	25	4	26	8	28	0	29	4	30	8	32	0	33	4
17	22	8	24	1	25	6	26	11	28	4	29	9	31	2	32	7	34	0	35	5
18	24	0	25	6	27	0	28	6	30	0	31	6	33	0	34	6	36	0	37	6
15	25	4	26	11	28	6	30	1	31	8	33	3	34	10	36	5	38	0	39	7
20	26	8	28	4	30	0	31	8	33	4	35	0	36	8	38	4	40	0	41	8
21	28	0	29	9	31	6	33	3	35	0	36	9	38	6	40	3	42	0	43	9
22	29	4	31	2	33	0	34	10	36	8	38	6	40	4	42	2	44	0	45	10
23	30	8	32	7	34	6	36	5	38	4	40	3	42	2	44	1	46	0	47	11
24	32	0	34	0	36	0	38	0	40	0	42	0	44	0	46	0	48	0	50	0
25	33	4	35	5	37	6	39	7	41	8	43	9	45	10	47	11	50	0	52	1
26	34	8	36	10	39	0	41	2	43	4	45	6	47	8	49	10	52	0	54	2
27	36	0	38	3	40	6	42	9	45	0	47	3	49	6	51	9	54	0	56	3
28	37	4	39	8	42	0	44	4	46	8	49	0	51	4	53	8	56	0	58	4
29	38	8	41	1	43	6	45	11	48	4	50	9	53	2	55	7	58	0	60	5
30	40	0	42	6	45	0	47	6	50	0	51	6	55	0	57	6	60	0	62	6

LOGS REDUCED TO ONE INCH BOARD MEASURE.

If the log is longer than is contained in the table, take any two lengths. The first column on the left gives the length of the Log in feet. The figures under D denote the diameters of the Logs in inches. Fractional parts of inches are not given.

The diameter of timber is usually taken 20 feet from the butt. All logs short of 20 feet, take the diameter at the top, or small end.

To find the number of feet of boards which a log will produce when sawed, take the length of feet in the first column on the left hand, and the diameter at the top of the page in inches.

Suppose a log 12 feet long and 24 inches in diameter. In the left hand column is the length, and opposite 12 under 24 is 300, the number of feet of boards in a log of that length and diameter.

Lng. Ft.	D. 12	D. 13	D. 14	D. 15	D. 16	D. 17	D. 18	D. 19	D. 20	D. 21	D. 22	D. 23	D. 24
10	54	66	76	93	104	170	137	154	179	194	210	237	256
11	59	72	83	102	114	131	151	169	196	213	231	261	270
12	64	78	90	111	124	143	164	184	214	232	252	285	300
13	69	84	97	120	134	154	177	199	231	251	273	308	327
14	74	90	104	129	144	166	191	214	249	270	293	332	350
15	79	96	111	138	154	177	204	229	266	289	314	355	376
16	84	102	118	146	164	189	217	244	284	308	335	379	401
17	89	108	126	155	173	200	231	259	301	327	356	402	426
18	94	114	133	164	183	212	244	274	319	346	377	426	451
19	99	121	140	173	193	223	257	289	336	365	498	449	477
20	104	127	147	182	203	236	271	304	354	384	419	473	501
21	109	133	154	191	213	247	284	319	371	403	440	497	527
22	114	139	161	200	223	259	297	334	389	422	461	520	552
23	119	145	168	209	233	270	311	349	407	441	681	542	568
24	124	151	176	218	243	282	324	364	424	460	502	568	613
25	129	157	183	227	253	293	337	379	442	479	523	591	628
26	134	163	190	236	263	305	350	394	459	498	544	615	653
27	139	169	197	245	273	316	363	409	477	517	565	639	678
28	144	175	204	254	283	328	376	424	494	536	586	663	703
29	149	181	211	263	293	339	389	439	512	555	607	687	728
30	154	187	218	272	303	351	402	454	529	574	628	711	753
31	159	193	225	281	313	362	415	469	547	593	649	785	778

Lng. Ft.	D. 25	D. 26	D. 27	D. 28	D. 29	D. 30	D. 31	D. 32	D. 33	D. 34	D. 35	D. 36
10	283	309	339	359	377	407	440	456	486	496	543	573
11	311	340	374	396	415	447	484	502	535	546	598	630
12	340	371	408	432	453	489	528	548	584	596	653	688
13	369	404	442	469	491	530	572	594	633	646	708	746
14	397	435	476	505	529	571	618	640	682	696	762	803
15	426	465	511	541	567	612	662	686	731	746	817	861
16	455	496	545	578	605	653	706	732	780	796	872	919
17	483	527	579	614	643	694	751	778	829	846	927	976
18	512	558	613	650	681	735	795	824	878	896	981	1034
19	541	590	647	688	719	776	839	870	927	946	1036	1092
20	569	621	681	724	757	817	884	916	976	996	1091	1148
21	598	652	716	760	796	859	928	962	1025	1046	1146	1206
22	627	684	750	796	834	900	972	1008	1074	1096	1200	1264
23	655	715	784	833	872	941	1017	1054	1123	1146	1255	1318
24	684	746	818	869	910	982	1061	1100	1172	1196	1310	1376
25	713	777	853	906	948	1023	1105	1146	1221	1246	1365	1434
26	742	808	887	942	986	1064	1149	1192	1270	1296	1420	1492
27	771	839	921	979	1024	1105	1193	1238	1319	1346	1475	1550
28	800	870	955	1015	1062	1246	1237	1284	1368	1396	1530	1608
29	829	901	989	1052	1100	1187	1281	1330	1417	1446	1585	1666
30	858	932	1023	1088	1138	1228	1325	1376	1466	1496	1640	1724
31	887	963	1057	1125	1176	1269	1369	1422	1515	1546	1695	1782

SOLID CONTENTS OF EQUAL SIDES TIMBER.

If the Log is shorter than is contained in the Table, take half or quarter of some length, if longer double some length. The length of the Log is given on the top of the columns, the diameter in the left hand column. To obtain the Cubical Contents of Masts, Spars, Round Logs, &c., subtract one-fourth from the Contents.

D.	L. 9	L. 10	L 11	L 12	L. 13	L. 14	L. 15	L. 16	L. 17	L. 18	L. 19	L. 20
6	2 3	2 6	2 9	3 0	3 3	3 6	3 9	4 0	4 3	4 6	4 9	5 0
7	3 0	3 4	3 7	4 1	4 5	4 9	5 1	5 5	5 9	6 2	6 6	6 10
8	4 1	4 4	4 10	5 4	5 9	6 2	6 7	[illegible] 0	8 5	8 10	9 3	9 8
9	5 2	5 9	6 2	6 9	7 4	7 11	8 6	9 1	9 8	10 3	10 10	11 5
10	6 2	6 10	7 8	8 4	9 0	9 8	10 4	11 0	11 8	12 4	13 0	13 8
11	7 6	8 4	9 3	10 1	10 11	11 9	12 7	13 5	14 3	15 1	15 11	16 9
12	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0
13	10 4	11 7	12 10	14 1	15 3	16 5	17 9	18 9	19 11	21 1	22 3	23 5
14	12 2	13 7	14 11	16 4	47 8	18 11	20 8	21 7	22 11	24 3	25 7	26 11
15	14 2	15 9	17 2	18 9	20 4	21 10	23 5	25 0	26 7	28 2	29 9	31 4
16	16 0	17 10	19 6	21 4	23 1	24 10	26 7	28 4	30 1	31 10	33 7	35 4
17	18 0	20 0	22 0	24 1	26 1	28 1	30 1	32 1	34 1	36 1	38 1	40 1
18	20 3	22 6	24 9	27 0	29 3	31 6	33 9	36 0	38 3	40 6	42 9	45 0
19	22 6	25 0	27 6	30 1	32 7	35 1	37 7	41 1	43 7	46 1	48 7	52 0
20	25 0	27 10	30 10	33 4	36 1	38 10	41 7	44 4	47 2	50 0	52 9	55 9
21	27 7	30 8	33 9	36 9	39 10	42 11	46 0	49 1	52 2	55 3	58 4	61 5
22	30 2	33 6	36 10	40 4	43 8	47 0	50 4	53 8	57 0	60 4	63 8	67 0
23	33 0	66 8	40 4	44 1	47 9	51 5	55 1	58 9	62 5	65 1	69 9	73 5
24	36 0	40 0	44 0	48 0	52 0	56 0	60 0	64 0	68 0	72 0	76 0	80 0
25	39 0	43 4	48 1	52 1	56 5	60 9	65 1	69 5	73 9	78 1	82 5	86 9
26	42 2	46 11	51 7	56 4	61 0	65 8	70 4	75 0	79 8	84 4	89 0	93 8
27	45 7	50 8	55 9	60 9	65 10	70 11	76 0	81 1	86 2	91 7	96 8	101 11
28	49 0	54 5	59 10	65 4	70 9	76 2	81 7	85 0	92 5	97 10	103 3	108 8
29	52 6	58 4	64 2	70 1	75 11	81 9	87 7	93 5	99 3	106 1	112 11	117 9
30	55 9	62 0	68 3	75 0	81 3	87 6	93 9	100 0	106 3	112 6	118 9	125 0

CAST IRON.

WEIGHT OF A FOOT IN LENGTH OF FLAT CAST IRON.

Width of Iron.	Thick, 1-4th inch.	Thick, 3-8ths inch.	Thick, 1-2 inch.	Thick, 5-8ths inch.	Thick, 3-4ths inch.	Thick, 7-8ths inch.	Thick, 1 inch.
Inches.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
2	1.56	2.34	3.12	3.90	4 68	5.46	6 25
2¼	1.75	2.63	3.51	4.39	5.27	6.15	7.03
2½	1.95	2.92	3.90	4.88	5.85	6 83	7.81
2¾	2.14	3.22	4.29	5.37	6.44	7.51	8 59
3	2 34	3.51	4 68	5.85	7 03	8.20	9.37
3¼	2.53	3.80	5 07	6.34	7.61	8.88	10 15
3½	2.73	4 10	5.46	6 83	8.20	9.57	10.93
3¾	2.93	4 39	5.85	7.32	8.78	10.25	11.71
4	3 12	4 68	6.25	7.81	9.37	10.93	12.50
4¼	3 32	4.97	6 64	8 30	9 96	11.62	13 28
4½	3 51	5.27	7.03	8.78	10.54	12.30	14 06
4¾	3.71	5 56	7 42	9.27	11.13	12 98	14.84
5	3.90	5.86	7.81	9.76	11.71	13 67	15 62
5¼	4 10	6.15	8.20	10.25	12.80	14.35	16 40
5½	4 29	6.44	8.59	10.74	12.89	15 03	17 18
5¾	4.49	6.73	8.98	11.23	13.46	15 72	17 96
6	4.68	7 03	9.37	11.71	14 06	16 40	18 75

WEIGHT OF ONE FOOT OF FLAT BAR IRON.

If a Bar of Iron be thicker than contained in the Table, add together ıı weight of two Numbers, or treble the weight of one Number. Wanted ıe weight of 1 foot of Bar Iron, 4 inches broad and 2 1-4 inches thick. pposite 4 and under 1 is 13-364, which doubled is 26-728; add the weight 1-4th (3-341), equal 30-069 lbs.

in inches.	THICKNESS IN PARTS OF AN INCH.								
	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1 in.
1	.835	1.044	1.253	1.461	1.670	2 088	2.506	2.923	3.340
1⅛	.939	1 174	1.409	1.644	1.878	2.348	2.818	3.287	3.755
1¼	1.044	1.305	1.566	1.826	2.088	2.609	3.132	3.653	4.176
1⅜	1.148	1.435	1.722	2.009	2.296	2.870	3.444	4.018	4.592
1½	1.252	1.566	1.879	2.192	2.504	3.131	3.758	4 384	5.008
1⅝	1.358	1.696	2.035	2.374	2.716	3.392	4.070	4.749	5.432
1¾	1.462	1.827	2.192	2.557	2.924	3 653	4.384	5.114	5.848
1⅞	1.566	1.957	2.348	2.740	3.132	3.914	4.696	5.479	6.264
2	1.671	2.088	2.505	2.922	3.342	4.175	5.010	5.845	6.684
2⅛	1.775	2.218	· 862	3.105	3.550	4.435	5.324	6.210	7.100
2¼	1.880	2.348	- 818	3.288	3.760	4.696	5.636	6.575	7.520
2⅜	1.984	2.479	2.975	3.470	3.968	4.957	5 950	6 941	7.936
2½	2.088	2.609	3 131	3.653	4.176	5.218	6.262	7.306	8.352
2⅝	2.193	2.740	3 288	3.836	4.386	5.479	6.576	7.671	8.772
2¾	2.297	2.870	3 444	4.018	4.594	5.740	6.888	8.036	9.188
2⅞	2.402	3.001	3 601	4 201	4.804	6.001	7.202	8.402	9.608
3	2.506	3.131	3 758	4 384	5 012	6 262	7.516	8.767	10.024
3¼	2.715	3.392	4 071	4.749	5 430	6.784	8.142	9.498	10.860
3½	2.923	3 653	4 384	5 114	5.846	7.306	8.768	10 228	11.692
3¾	3 132	3 914	4.697	5 479	6 264	7 828	9.394	10.959	12.528
4	3.341	4 175	5.010	5.845	6 682	8.350	10.020	11.690	13.364
4¼	3.549	4.436	5.8[illegible]	6 210	7.098	8.871	10 646	12.421	14.196
4½	3.758	4 697	5.6[illegible]	6 575	7.516	9 393	11 272	13.151	15.032
4¾	3 966	4 958	[illegible]	6 941	7.932	9 915	11.898	13.881	15.864
5	4 175	5.219	6.263	7 306	8.350	10.437	12 526	14.612	16 700
5¼	4.384	5.479	6 576	7 671	8 768	10.958	13.152	15 343	17.536
5½	4.593	5.741	6 889	8.037	9 186	11.480	13.778	16.073	18.372
5¾	4.801	6 001	7.202	8.403	9 602	12 002	14 404	16.304	19.204
6	5.010	6.262	7.615	8 767	10.020	12 524	15 030	17 535	20.042

WEIGHT OF ONE SQUARE FOOT OF SHEET IRON, &c.

Names	Thickness by the Birmingham (Eng.) Wire Gauge.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
on.	12.50	12.00	11.00	10.00	8.74	8.12	7.50	6.86	6.24	5.62	5.00	4.38	3.75	3.12
op.	14 50	13.90	12.75	11.60	10.10	9.40	8.70	7.90	7.20	6.50	5.80	5.08	4.34	3.60
rass	13.75	13.20	12.10	11.90	9.61	8 93	8.25	7.54	6.86	6.18	5.50	4.81	4.12	3.43

	Thickness by the Wire Gauge.															
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
on.	2 82	2 50	2 18	1.86	1 70	1 54	1.40	1.25	1.12	1 00	.90	.80	.72	.64	.56	.50
op.	3 27	2 90	2.53	2 15	1 97	1 78	1 62	1 45	1.30	1 16	1.04	.92	.83	.74	.64	58
ass	3.10	2 75	2 40	2.04	1 87	1.69	1.54	1 37	1 23	1 10	.99	.88	.79	.70	.61	.55

No. 1 Wire Gauge is 5-16ths of an inch; No. 4 is 1-4th; No. 11 is 1-8th; . 13 is 1-12th; No. 15 is 1-14th; No. 16 is 1-16th: No 17 is 1-18th; No. 19 1-23; No. 22 is 1-32.

WEIGHT OF BAR IRON AND OTHER METALS.

RUSSIA SHEET IRON

Measures 56 by 28 Inches, and is rated by the weight per sheet. The numbers run from 8 to 18 Russian lbs. per sheet. 8 Russian pounds equal 7.2 English pounds; 9=8.1 lbs.; 19=9 lbs.; 11=10 lbs.; 12=11.2 lbs., &c.—100 Russian lbs. equal 90 lbs. English.

WEIGHT OF ONE SQUARE FOOT OF PLATE IRON, &c.

Thickness in parts of an inch.	Iron.	Copper.	Brass.	Lead.	Thickness in parts of an inch.	Iron.	Copper.	Brass.	Lead.
1/16	2.5	2.9	2.7	3.7	7/16	17.5	20.3	19.0	25.9
⅛	5.0	5.8	5.5	7.4	½	20.0	23.2	21.8	29.6
3/16	7.5	8.7	8.2	11.1	⅝	25.0	28.9	27.1	37.0
¼	10.0	11.6	10.9	14.8	¾	30.0	34.7	32.5	44.4
5/16	12.5	14.5	13.6	18.5	⅞	35.0	40.4	37.9	57.8
⅜	15.0	17.4	16.3	22.2	1	40.0	46.2	43.3	59.2

WEIGHT ONE FOOT IN LENGTH OF SQUARE AND ROUND BAR IRON.

Side and diameter in inches.	Square Iron. in lbs.	Round Iron. in lbs.	Side and diameter in inches.	Square Iron in lbs.	Round Iron in lbs.	Side and diameter in inches.	Square Iron. in lbs.	Round Iron in lbs.
¼	.209	.164	1⅝	8.820	6.928	3¾	46.969	36.895
5/16	.326	.256	1¾	10.229	8.043	3⅞	50.153	39.390
⅜	.470	.369	1⅞	11.744	9.224	4	53.440	41.934
7/16	.640	.503	2	13.360	10.496	4⅛	56.833	44.637
½	.835	.656	2⅛	15.083	11.846	4¼	60.329	47.385
9/16	1.057	.831	2¼	16.909	13.283	4⅜	63.930	50.211
⅝	1.305	1.025	2⅜	18.840	14.797	4½	67.637	53.132
11/16	1.579	1.241	2½	20.875	16.396	4⅝	71.445	56.113
¾	1.879	1.476	2⅝	23.115	18.146	4¾	75.359	59.187
13/16	2.205	1.732	2¾	25.259	19.842	4⅞	79.378	62.344
⅞	2.558	2.011	2⅞	27.608	21.684	5	83.510	65.585
15/16	2.936	2.306	3	30.070	23.653	5¼	92.459	72.618
1	3.340	2.624	3⅛	32.618	25.620	5½	101.036	79.370
1⅛	4.228	3.321	3¼	35.279	27.709	5¾	110.429	86.731
1¼	5.219	4.099	3⅜	38.045	29.881	6	120.243	94.610
1⅜	6.315	4.961	4½	40.916	32.170			
1½	7.516	5.913	5⅝	43.890	34.472			

The weight of Bar Iron being 1
" " " Cast Iron = .95
" " " Steel. 1.03
" " " Copper, 1.1

WEIGHT OF ROUND AND SQUARE CAST IRON.

CAST IRON.—Weight of a Foot in Length of Square and Round.

SQUARE.				ROUND.			
ze.	Weight.	Size.	Weight.	Size.	Weight.	Size.	Weight.
hes are.	Pounds.	Inches Square.	Pounds.	Inches Diam.	Pounds.	Inches Diam.	Pounds.
	.78	4⅞	74.26	½	.61	4⅞	58.32
	1.22	5	78.12	⅝	.95	5	61.35
	1.75	5⅛	82.08	¾	1.38	5⅛	64.46
	2.39	5¼	86.13	⅞	1.87	5¼	67.64
	3.12	5⅜	90.28	1	2.45	5⅜	70.09
	3.95	5½	94.53	1⅛	3.10	5½	74.24
	4.88	5⅝	98.87	1¼	3.83	5⅝	77.65
	5.90	5¾	103.32	1⅜	4.64	5¾	81.14
	7.08	5⅞	107.86	1½	5.52	5⅞	84.71
	8.25	6	112.50	1⅝	6 48	6	88.35
	9.57	6¼	122.08	1¾	7.51	6¼	95.87
	10.98	6½	132 03	1⅞	8.62	6½	103.69
	12.50	6¾	142.38	2	9.81	6¾	111.82
	14.11	7	153.12	2⅛	11.08	7	120.26
	15.81	7¼	164.25	2¼	12.42	7¼	129.
	17.62	7½	175.78	2⅜	13.84	7½	138.05
	19.53	7¾	187.68	2½	15.33	7¾	147.41
	21.53	8	200.12	2⅝	16.91	8	157.08
	23.63	8¼	212.56	2¾	18.56	8¼	167.05
	25.83	8½	225.78	2⅞	20.28	8½	177.10
	28.12	8¾	239 25	3	22.18	8¾	187.91
	30.51	9	253.12	3⅛	23.96	9	198.79
	33.	9¼	267.38	3¼	25.92	9¼	210.
	35.59	9½	282.	3⅜	27.95	9½	221.50
	38.28	9¾	297.07	3½	30.16	9¾	233.31
	41.06	10	312.50	3⅝	32.25	10	245.43
	43.94	10¼	328.32	3¾	34.51	10¼	257.86
	46.92	10½	344.53	3⅞	36.85	10½	270.59
	50.	10¾	361.13	4	39.27	10¾	283.63
	53.14	11	378.12	4⅛	41.76	11	296.97
	56.44	11¼	395.50	4¼	44.27	11¼	310.63
	59.81	11½	413.78	4⅜	46.97	11½	224.59
	63.28	11¾	431.44	4½	49.70	11¾	338.85
	66.84	12	450.	4⅝	52.50	12	353.43
	70.50			4¾	55.37		

STEEL.—Weight of a Foot in Length of Flat.

.	Thick, 1-4 in.	Thick, 3-8ths.	Thick, 1-2 in.	Thick, 5-8ths,	Side.	Thick, 1-4 in.	Thick, 3-8ths.	Thick, 1-2 in.	Thick, 5-8ths.
	Pds.	Pds	Pds.	Pds.	In.	Pds.	Pds.	Pds.	Pds.
	.852	1.27	1.70	2.13	2½	2.13	3.20	4.26	5,32
	.958	1.43	1.91	2.39	2¾	2.34	3.51	4 68	5.85
	1.06	1.59	2.13	2.66	3	2.55	3.83	5.11	6.39
	1.17	1.75	2.34	2.92	3¼	2.77	4.15	5.53	6.92
	1.27	1.91	2.55	3.19	3½	2.98	4.47	5.98	7.45
	1.49	2.23	2.98	3.72	3¾	3.19	4.79	6.38	7.98
	1.70	2.55	3.40	4.26	4	3.40	5.10	6.80	8.52
	1.91	2.87	3.83	4.79					

WEIGHT OF METALS.

PATENT IMPROVED LEAD PIPE.—*Sizes and Weight per Foot.*

Calibre.	Weight per foot.	Calibre.	Weight per foot.	Calibre.	Weight per foot.	Calibre.	Weight per foot.	Calibre.	Weight per foot.
Inches.	lbs. ozs.	Inches.	lbs. ozs.	Inches.	lbs. ozs.	Inches.	lbs. ozs.	Inches.	lbs. ozs.
⅜	6	½	1 4	¾	1 4	1	4 0	1¼	5 0
"	8	"	1 8	"	2 0	"	6 0	1¾	4 0
"	10	"	2 0	"	2 4	1¼	2 8	2	5 0
"	12	"	3 0	"	2 8	"	3 0	"	6 0
"	1 0	⅝	13	"	3 0	"	3 8	"	7 0
"	1 8	"	1 0	"	4 0	"	4 0	2½ } ¼ in. thick.	11 0
½	8	"	1 8	1	1 8	"	5 0	3	13 0
"	10	"	2 0	"	1 12	1½	3 0	3½	15 0
"	12	"	2 12	"	2 0	"	3 8	4	18 0
"	14	¾	12	"	2 8	"	4 0	4½	20 0
"	1 0	"	14	"	3 0	"	4 8	5	22 0

SHEET LEAD.—Weight of a Square Foot, 2½, 3, 3½, 4, 4½, 5, 6, 7, 8½, 9, 10 lbs., and upwards.

BRASS, COPPER, STEEL, AND LEAD.—*Weight of a Foot.*

	BRASS.		COPPER.		STEEL.		LEAD.	
Diameter and Side of Square.	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.
Inches.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
¼	.17	.22	.19	.24	.17	.21		
⅜	.39	.50	.42	.54	.38	.48		
½	.70	.90	.75	.96	.67	.85		
⅝	1.10	1.40	1.17	1.50	1.04	1.33		
¾	1.59	2.02	1.69	2.16	1.50	1.91		
⅞	2.16	2.75	2.31	2.94	2.05	2.61		
1	2.83	3.60	3.02	3.84	2.67	3.40	3.87	4.93
1⅛	3.58	4.56	3.82	4.86	3.38	4.34	4.90	6.25
1¼	4.42	5.63	4.71	6.	4.18	5.32	6.06	7.71
1⅜	5.35	6.81	5.71	7.27	5.06	6.44	7.33	9.33
1½	6.36	8.10	6.79	8.65	6.02	7.67	8.72	11.11
1⅝	7.47	9.51	7.94	10.15	7.07	9	10.24	13.04
1¾	8.66	11.03	9.21	11.77	8.20	10.14	11.87	15.12
1⅞	9.95	12.66	10.61	13.52	9.41	11.98	13.63	17.36
2	11.32	14.41	12.08	15.38	10.71	13.63	15.51	19.75
2⅛	12.78	16.27	13.64	17.36	12.05	15.80	17.51	22.29
2¼	14.32	18.24	15.29	19.47	13.51	17.20	19.63	25.
2⅜	15.96	20.32	17.03	21.69	15.05	19.17	21.80	27.80
2½	17.68	22.53	18.87	24.03	16.68	21.21	24.24	30.86
2⅝	19.50	24.83	20.81	26.50	18.39	23.41	26.72	34.02
2¾	21.40	27.25	22.84	29.08	20.18	25.70	29.33	37.34
2⅞	23.39	29.78	24.92	31.79	22.06	28.10	32.05	40.81
3	25.47	32.43	27.18	34.61	24.23	30.60	34.90	44.44

CAST IRON.—*Weight of a Superficial Foot from ¼ to 2 inches thick.*

Size.	Weight	Size.	Weight	Size.	Weight	Size.	Weight	Size.	Weight
Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.
¼	9.37	⅝	23.43	1	37.50	1⅜	51.56	1¾	65.62
⅜	14.06	¾	28.12	1⅛	42.18	1½	56.25	1⅞	70.31
½	18.75	⅞	32.81	1¼	46.87	1⅝	60.93	2	75.

NSIONS OF CYLINDRICAL COLUMNS OF CAST IRON TO SUSTAIN A PRESSURE WITH SAFETY.

LENGTH OR HEIGHT IN FEET.										
4	6	8	10	12	14	16	18	20	22	24
WEIGHT OR LOAD IN CWTS.										
72	60	49	40	32	26	22	18	15	13	11
119	105	91	77	65	55	47	40	34	29	25
178	163	145	128	111	97	84	73	64	56	49
247	232	214	191	172	156	135	119	106	94	83
326	310	288	266	242	220	198	178	160	144	130
418	400	379	354	327	301	275	251	229	208	189
522	501	479	452	427	394	365	337	310	285	262
607	592	573	550	525	497	469	440	413	386	360
1032	1013	989	959	924	887	848	808	765	725	686
1333	1315	1289	1259	1224	1185	1142	1097	1052	1005	959
1716	1697	1672	1640	1603	1561	1515	1467	1416	1364	1311
2119	2100	2077	2045	2007	1964	1916	1865	1811	1755	1697
2570	2550	2520	2490	2450	2410	2358	2305	2248	2189	2127
3050	3040	3020	2970	2930	2900	2830	2780	2730	2670	2600

Practical utility of the Table.

e.—Wanting to support the front of a building with cast iron columns ; in length, 8 inches in diameter, and the metal 1 inch in thickness; weight may I confidently expect each column capable of supporting ut tendency to deflection?

Opposite 8 inches diameter and under 18 feet=1097
* Also opposite 6 in. diam. and under 18 feet= 440
=657 cwt.

* This deduction is on account of the core.

MOLDER'S TABLE.

ır Iron being 1,			*Cast Iron* heing 1,			*Yellow Pine* being 1,		
ron equal		.95	Bar Iron equal		1.07	Cast Iron equal		12.
	"	1.02	Steel	"	1.08	Brass	"	12.7
ır	"	1.16	Brass	"	1,16	Copper	"	13.3
	"	1.09	Copper	"	1.21	Lead	"	18.1
	"	1.48	Lead	"	1.56	Zinc	"	11.5

uppose I have an article of plate iron, the weight of which is 728 ut want the same of copper. and of similar dimensions, what will be ight?

728 × 1.16 = 844.48 lbs.

. model of Dry Pine weighing 3 lbs., and in which the iron for its uction forms no material portion of the weight, what may I anti- its weight to be in cast iron.

3 × 12 = 36 pounds.

equently occurs, in the construction of models, that neither the y or condition of the wood can be properly estimated; and in such it may be a near enough approximation to reckon 13 lbs. of cast) each pound of model.

WOOD AND BARK MEASUREMENT—AT SIGHT.

This table is calculated for *Wood 4 feet in length.* If the wood be 8 feet long double the products; if 12 treble, and so on. If the wood should be only 3 feet in length, then deduct from the products ¼; if 3½ deduct 1-8. Fractions of a solid foot less than ½ are not counted; half foot and over is counted as 1 foot,

The Rule for Measuring Wood is, if in feet only, to multiply the length by the width, and that product by the height, and divide the last product, if for for feet, by 16, and if for Cords, by 128. But if any of the dimensions be in feet and inches, reduce the whole to inches and multiply as above, then divide the product by 1728 in order to obtain cubic feet, and then divide the quotient by 128 to obtain cords.

Hgt.		*Width 2 ft and*				*Width 3 ft and*				*Width 4 ft and*				*Width 5 ft and*				*Width 6 ft and*				*Width 7 ft and*				*Width 8 ft and*			
Ft.	*In*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*	*0in*	*3in*	*6in*	*9in*
1	0	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	2	9	11	12	13	14	15	16	18	19	20	21	22	23	25	26	27	28	29	30	32	33	34	35	36	37	39	40	41
1	4	11	12	13	15	16	17	19	20	21	23	24	25	27	28	29	31	32	33	35	36	37	39	40	41	43	44	45	47
1	6	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	36	28	39	41	42	44	45	47	48	50	51	53
1	8	13	15	17	18	20	22	23	25	27	29	30	32	33	35	37	38	40	42	43	45	47	48	50	52	53	55	57	58
1	10	15	17	18	20	22	24	26	28	29	31	33	35	37	39	40	42	44	46	48	50	51	53	55	57	59	61	62	64
2	0	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
2	2	17	20	22	24	26	28	60	33	35	37	39	41	43	46	48	50	52	54	56	59	61	63	65	67	69	72	74	76
2	4	19	21	23	26	28	30	33	35	37	40	42	44	47	49	51	54	56	58	61	63	95	68	70	72	75	77	79	82
2	6	20	23	25	28	30	33	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75	78	80	83	85	88
2	8	21	24	27	29	32	35	37	40	43	46	48	51	53	56	59	61	64	67	69	72	75	77	80	83	85	88	91	93
2	10	23	26	28	31	34	37	40	43	45	48	51	54	57	50	62	65	68	71	74	77	79	82	85	88	91	94	96	99
3	0	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105
3	2	25	29	32	35	38	41	44	48	51	54	57	60	63	57	70	73	76	79	82	86	89	92	95	98	101	105	108	111
3	4	27	30	33	37	40	43	47	50	53	57	60	63	67	70	73	77	80	83	87	90	93	97	100	103	107	110	113	117
3	6	28	32	35	39	42	46	49	53	56	60	63	67	70	74	77	81	84	88	91	95	98	102	105	109	112	116	119	123
3	8	29	33	37	40	44	48	51	55	59	63	66	70	73	77	81	84	88	92	95	99	103	106	110	114	117	121	125	128
3	10	31	35	38	42	46	50	54	58	61	65	69	73	77	81	84	88	92	96	100	104	107	111	115	119	123	127	130	134
4	0	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120	124	128	132	136	140
4	2	33	38	42	46	50	54	58	63	67	71	75	79	83	88	92	96	100	104	108	113	117	121	125	129	133	138	142	146
4	4	35	39	43	48	52	56	61	65	69	74	78	82	87	91	95	100	104	108	113	117	121	126	130	134	139	143	147	152
4	6	36	41	45	50	54	59	63	68	72	77	81	86	90	95	99	104	108	113	117	122	126	131	135	140	144	149	153	158
4	8	37	42	47	51	56	61	65	70	75	80	84	89	93	98	103	107	112	17	121	126	131	135	140	145	149	154	159	163
4	10	39	44	48	53	58	63	68	73	77	82	87	93	97	102	106	111	116	121	126	131	135	140	145	150	155	160	164	169
5	0	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175

Example.—How many cords of wood in a pile 60 feet long, 6 feet high and 4 feet wide?

$$\begin{array}{r} 60 \\ 6 \\ \hline 360 \\ 4 \\ \hline 128)\ 1440 \end{array}\quad 11\tfrac{1}{4}\ \textit{cords.}$$

VALUE OF WOOD AND BARK PER FEET AND CORD.

The price per Cord is found at the top of the column. The Solid Feet are in the left hand column, (under Ft.) opposite which are the prices per foot. 128 cubic feet, or a Cord, or pile, 8 feet long 4 feet wide and 4 feet high, is a cord of wood as established by law in most of the States and the Dominion of Canada. If the price of more than one cord is required, the amount can be readily added or multiplied.

	Ft.	2.00	2.25	2.50	3.00	3.25	3.50	4.00	4.25	4.50	5.00	5.25	5.50	6.00	6.25	6.50	7.00	7.25	7.50	8.00	8.50	9.00	9.50	10.00
	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	8
	2	3	4	4	5	5	5	6	7	7	8	8	9	9	10	10	11	11	12	13	13	14	14	16
	3	5	5	6	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19	20	21	22	23
	4	6	7	8	9	10	11	13	13	14	16	16	17	19	20	20	22	23	23	25	27	28	30	31
	5	8	9	10	12	13	14	16	17	18	20	21	21	23	24	25	27	28	29	31	33	35	37	39
	6	9	11	12	14	15	16	19	20	21	23	25	26	28	29	30	33	34	35	38	40	42	45	47
	7	11	12	14	16	18	19	22	23	25	27	29	30	33	34	36	38	40	41	44	46	49	52	55
	8	13	14	16	19	20	22	25	27	28	31	33	34	38	39	41	44	45	47	50	53	56	59	63
	9	14	16	18	21	23	25	28	30	32	35	37	39	42	44	46	49	51	53	56	60	63	67	70
	10	16	17	20	24	25	27	31	33	35	39	41	43	47	49	51	55	57	59	63	66	70	74	78
1 Foot.	16	25	28	31	38	41	44	50	53	56	63	66	69	75	78	81	88	91	94	1 00	1 06	1 13	1 19	1 25
	20	31	35	39	47	51	55	63	67	70	78	82	86	94	98	1 02	1 09	1 13	1 17	1 25	1 33	1 41	1 48	1 56
	30	47	53	59	70	76	82	94	1 00	1 05	1 17	1 23	1 29	1 41	1 46	1 52	1 64	1 70	1 76	1 88	1 99	2 11	2 23	2 34
2 Feet.	32	50	56	63	75	81	88	1 00	1 06	1 13	1 25	1 31	1 38	1 50	1 56	1 63	1 75	1 81	1 88	2 00	2 13	2 25	2 38	2 50
	40	64	70	78	94	1 02	1 08	1 25	1 33	1 41	1 56	1 64	1 72	1 88	1 95	2 03	2 19	2 27	2 34	2 50	2 66	2 81	2 96	3 13
3 Feet.	48	75	84	94	1 13	1 22	1 31	1 50	1 60	1 69	1 88	1 97	2 06	2 25	2 35	2 44	2 63	2 72	2 81	3 00	3 19	3 38	3 56	3 75
	50	78	88	98	1 18	1 27	1 37	1 56	1 66	1 76	1 95	2 05	2 15	2 34	2 44	2 54	2 73	2 83	2 93	3 13	3 32	3 52	3 71	3 91
	60	94	1 05	1 17	1 40	1 52	1 64	1 88	1 99	2 11	2 34	2 46	2 58	2 81	2 93	3 05	3 28	3 40	3 52	3 75	3 98	4 22	4 45	4 69
4 Feet.	64	1 00	1 13	1 25	1 50	1 63	1 75	2 00	2 13	2 25	2 50	2 63	2 75	3 00	3 13	3 25	3 50	3 63	3 75	4 00	4 25	4 50	4 75	5 00
	70	1 09	1 23	1 37	1 64	1 78	1 91	2 19	2 32	2 46	2 73	2 87	3 01	3 28	3 42	3 55	3 83	3 96	4 10	4 38	4 65	4 93	5 19	5 47
5 Feet,	80	1 25	1 41	1 56	1 88	2 03	2 19	2 50	2 66	2 81	3 13	3 28	3 44	3 75	3 91	4 06	4 38	4 53	4 69	5 00	5 31	5 63	5 94	6 25
	90	1 41	1 58	1 76	2 12	2 29	2 46	2 81	2 99	3 16	3 51	3 69	3 87	4 22	4 39	4 57	4 92	5 10	5 27	5 63	5 98	6 33	6 67	7 03
6 Feet.	96	1 50	1 69	1 88	2 25	2 44	2 63	3 00	3 19	3 38	3 75	3 94	4 13	4 50	4 69	4 88	5 25	5 44	5 63	6 00	6 38	6 75	7 13	7 50
	100	1 56	1 76	1 95	2 36	2 54	2 73	3 13	3 32	3 52	3 91	4 10	4 30	4 69	4 88	5 08	5 47	5 66	5 86	6 25	6 64	7 03	7 41	7 82
7 Feet.	112	1 75	1 97	2 19	2 63	2 84	3 06	3 50	3 72	3 94	4 38	4 59	4 81	5 25	5 47	5 69	6 13	6 34	6 56	7 00	7 44	7 87	8 31	8 75
8 Feet.	128	2 00	2 25	2 50	3 00	3 25	3 50	4 00	4 25	4 50	5 00	5 25	5 50	6 00	6 25	6 50	7 00	7 25	7 50	8 00	8 50	9 00	9 50	10 00

CISTERNS—SCREWS—CUBIC OR SOLID MEASURE.

CAPACITY OF CISTERNS AND RESERVOIRS IN GALLONS.

Depth, 10 *Inches*:—*Diameter from* 2 *to* 25 **Feet.**

2	feet	19,5	5	feet	122.40	8	feet	313 33	12	feet	705.
2½	"	30.6	5½	"	148.10	8½	"	353.72	13	"	827 4
3	"	44.06	6	"	176.25	9	"	396,56	14	"	959.6
3½	"	59.97	6½	"	206.85	9½	"	461.40	15	"	1101.6
4	"	78.83	7	"	239.88	10	"	489.20	20	"	1958.4
4½	"	99.14	7½	"	275.40	11	"	592.40	25	"	3059.9

NUMBER OF THREADS IN V-THREAD SCREWS.

Diam. in inches.......	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1	1⅛	1¼	1⅜
No. of threads........	20	18	16	14	12	11	10	9	8	7	7	6
Diam. in inches.......	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	
No. of threads........	6	5	5	4½	4½	4	4	3½	3½	3¼	3¼	
Diam. in inches.......	3¾	4	4¼	4½	4¾	5	5¼	5½	5¾	6		
No. of threads.........	3	3	2⅞	2⅞	2¾	2¾	2⅝	2⅝	3½	2½		

The depth of the threads should be half their pitch. The diameter of a screw, to work in the teeth of a wheel, should be such, that the angle of the threads does not exceed 10°

CUBIC, OR SOLID MEASURE.

To find the Cubical Content in a *Stick* of *Timber*, *Block* of *Stone*, *Box*, *Bin*, &c. If all the Dimensious are in Feet, multiply the Length by the Breadth, and this product by the Depth to obtain the number of Cubic Feet.

If the Length is in Feet and the width and depth in inches, multiply the length by the width and this Product by the depth in inches,—then divide the last Product by 144 for the Cubic Feet. If all the Dimensions are in Feet and Inches reduce the whole to Inches, then multiply the Length, Breadth and Depth together, and divide the Product by 1728 to obtain the Cubic Feet.

Required the number of cnbic feet in a *box*, *stone*, &c., 4½ feet long, 2½ feet wide and 2 feet deep?

4·5 × 2.5 × 2 = 22½ *cubic feet.*

To find the capacity of a *bin*, *cistern*, *tanner's vat*, &c., find its (interior) cubic contents in *inches*, by the preceding rules, then if the capacity be required in *gallons*, divide the whole number of inches by 231; — if in bushels, by 2150.42,—or, if in heaped bushels, by 2747·70.

Or, if the interior of a *coal bin* be 4 feet in length, 41 inches in breadth, and 32 inches in depth; then,

4 × 41 × 32 × ·00694 = 36½ cubic feet. = 2000 lbs., or 1 ton of Beaver Meadow or Lehigh Coal.

1 Cubic Foot of Peach Mountain Coal, broken or screened for Stoves, weighs 54 pounds, and requires 37 cubic feet of space to stow one ton of 2000 pounds.

Coal is bought at wholesale at the rate of 2240 pounds to the ton, and sold at retail at the rate of 2000 pounds to the ton, *screened.*

Or, if the interior of a *crib* be 6½ feet in length, 3¾ feet in breadth, and 3¼ feet in depth; then.

6·5 × 3·75 × 3·25 × ·80356 = 63·6522 (or 63½ bushels and ½ peck,)

The Solid Contents of all bodies, which are of uniform bigness throughout, whatever may be the form of the ends is found by multiplying the area of one end into its height or length.

144 inches equal (=) 1 square foot, (or, *area.*)
1728 inches equal (=) 1 cubic foot, (or, *solid contents.*)

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